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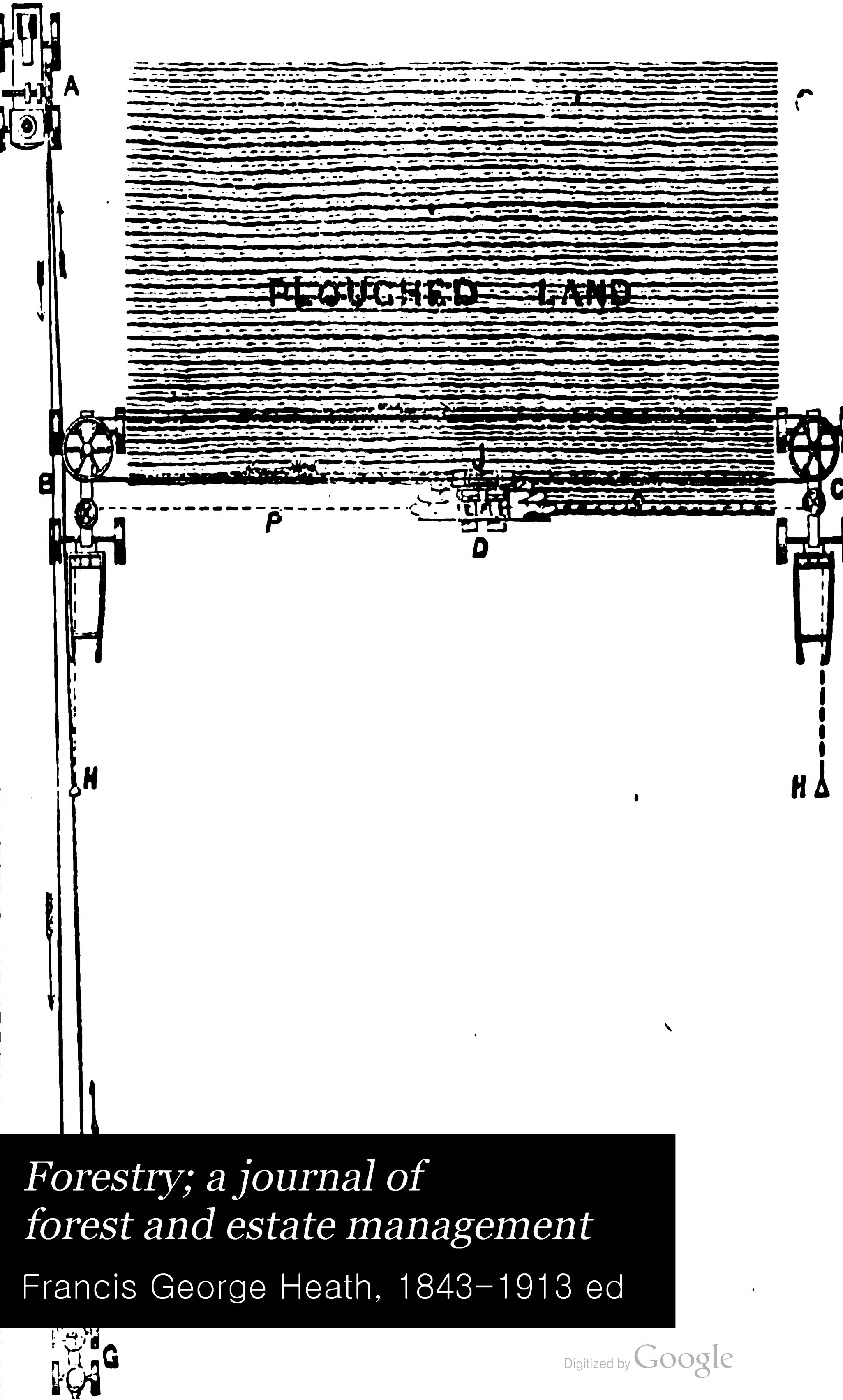

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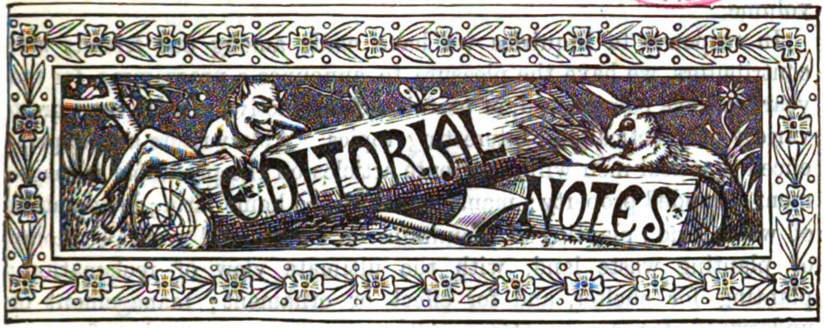

# EDITORIAL NOTES

WHILE making our arrangements for the issue of the Fourth Yearly Volume of the JOURNAL OF FORESTRY, commencing with the present number, a retrospect of the past three years presents us with many pleasant, instructive, and encouraging features. To these we look back with gratitude and pleasure, which prompts us to make every effort in our power to retain the support and confidence of our contributors along with the solid appreciation and goodwill of our now numerous circle of readers. Among our numerous friends and correspondents have we always found the warmest wishes for the success of our enterprise, and from them we have received aid and advice which have been of inestimable value to the cause which we have all so deeply at heart. With a fair field and no favour for an honest expression of just and reasonable views, we have gathered around us a substantial array of able and learned contributors, of whom any journal ought to feel proud—including learned professors, eminent arborists, practical foresters, landowners, forest and estate managers, gardeners, and land stewards; in short, every branch of estate management and rural economy is ably represented by the gentlemen who have so heartily supported us in our endeavours to promote the interests of forestry and the profitable management of landed property. To all of these are justly due our sincerest thanks, which we heartily tender, and trust that, as years pass on, time will only add to our mutual confidence, friendship, and esteem. With the continued help of our old friends, we look forward with hope to an annually increasing number of new ones. There are hosts of our readers, particularly estate managers and practical foresters, who possess valuable knowledge and means of observation, the recording of which in our pages would confer a great benefit on their fellow-men in similar circumstances. From these we are always gratified to receive communications, bearing on any matter connected with their profession, and we trust that many of them will freely enter the lists, and contribute their quota of information to the pages of our present volume.

In response to inquiries we have made among our friends and contributors, we have the pleasure to announce a programme, for the year we have commenced, of useful and instructive articles on a great variety of practical and interesting topics. Able writers and experienced practical men will contribute articles on the profitable management of landed property; management of the home farm; reclamation of waste land; planting of mountains for shelter and profit; economy of planting waste land, with the ultimate view of reclamation; planting for shelter, and for effect or ornament; management of underwood for cover; steam cultivation as a preparation for tree planting; nursery management; valuation and measurement of timber strength, density, and uses of timber; the conversion of timber, and the machinery employed; erection and maintenance of fences; formation and management of coppice plantations; fox coverts; brick and tile making; arterial drainage; improvement of grazing lands; planting bog; sea-side planting; and many other important subjects of practical, scientific, or historical interest. With such a substantial repertory to draw upon, and the continued support of our numerous correspondents at home and abroad, we look forward with a confident hope of attaining a fair measure of success, which at least it will always be our earnest endeavour to merit.

THE steady progress displayed in most branches of Forestry during the short period which has elapsed since this JOURNAL first appeared three years ago, and especially the marked increase in the attention devoted to it by the general public, is particularly gratifying to all who study the future interests of the country, and who are using their best endeavours to promote the welfare and prosperity of the community at large. A well-arranged scheme of tree planting and cultivation is not only highly profitable to the owner of the land upon which the operations are wisely carried out, but it also adds largely to the comfort and amenity of the neighbourhood, and multiplies the branches of labour and the economical products of the district. So many solid advantages are clearly to be derived from judicious tree planting, that one is apt to marvel at the thought that there should exist at the present day any landowner so blind to his own interests as to neglect the improvement of his property by a well-advised system of planting, for shelter, ornament, and profit. However, the fact is only too patent that such wasteful neglect still prevails in our midst to a much greater extent than is creditable to the wisdom of the owners, or beneficial to the prosperity and best interests of the country.

In the laying-out and formation of plantations, for whatever purpose they may be intended, nothing can be more unwise and unprofitable than the employment of inexperienced persons in designing them, and unskilled labour in their formation and management. The ablest knowledge that can be obtained should always be consulted before adopting a plan of operations which, to be really useful and profitable, must be carried out, from one generation to another, with experienced foresight. The evils arising from a badly-designed scheme are often of such a nature as not to be easily detected by an ordinary observer, until they have stamped their features so deeply on the property that it takes many years of judicious treatment to rectify them, even where such is possible, as in many instances total effacement, often at considerable loss, is the only remedy for such vexatious and injudiciously contrived work. By consulting only the best authorities, and adopting the plans and advice of thorough knowledge and skill, the best results will certainly be obtained, and that which under other advice might have been a loss or but little gain, will turn out to be a highly profitable investment.

It is also of the utmost importance that the work of planting and the after management of plantations should be conducted only by thoroughly trained foresters. Matured experience, skill and foresight are nowhere more necessary than in directing the practical operations of forestry. The immense amount at stake, and the costly nature of any error arising from a want of knowledge and careful forethought in the management of plantations, requires that none but careful and thoroughly competent men should be entrusted with the ordering and due performance of such important work. Occasionally we may find the woods and plantations on a property fairly well managed and kept in good order, by a man who has had no special training for the duties of a forester, but who, from some cause or other, has been placed in a position where his natural taste and ability have found a congenial sphere. On the other hand, this haphazard system of selecting a "forester" has left its ruinous mark on many estates, and practically rendered worthless what ought to have been a source of considerable wealth and unmixed pleasure to the owners. Let the demand for thoroughly qualified foresters once arise, there will be no lack of able and intelligent men entering the field to duly qualify themselves for the office, and the owners of woodlands should, in their own interests, take every care that none but able and well-trained men are appointed to such an important charge. The increasing value of woodland property, and the extension of plantations throughout the country, must give an impetus to the demand for properly qualified foresters; the education and training of such, at present, are left to mere chance, with no recognised authority or standard to guide them. Even those who are fortunate enough to get employment in extensive forests on a private estate, where every operation is carried out on the most enlightened principles by an able and intelligent head forester, have many obstacles to overcome in their desire to obtain a perfect knowledge of the theory and practice of their profession, and which can never be obviated while their training has to be carried on at a distance from a centre of learning, fully equipped with all modern scientific and technical appliances.

For that, and many other reasons of vital importance to this country and its extensive possessions in all parts of the world, the institution of a School of Forestry is one of the most pressing questions of the day. No question of equal importance to the future welfare of the empire has been so utterly neglected by the State, and few neglected matters of any importance could be so easily rectified, at a cost comparatively trifling to the vast interests involved. The power and the means are ready to hand, if the proper authorities will only undertake to apply them in an enlightened and judicious manner for the benefit of forestry and the national interests. In these days of rapid progress, delay is more than ever proverbially dangerous. No opportunity should therefore be neglected by the numerous and influential class who are specially interested in our forests and their products, to press forward the institution of a British Forest School, where our youths can be efficiently trained and educated in every branch of the art and science of forestry, and so obviate the dangers which threaten the country at no distant day from the want of such a necessary institution.

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Next month we intend to place before our readers, in accordance with our usual custom, as full a return of the prices realized for Forest Produce throughout the country, as through the courtesy of our correspondents we may be favoured with. Schedules will be sent in the course of a few days to all our correspondents, but any one who may not have received a copy will be at once supplied with one to fill up, on application, by letter or otherwise, at our office, 14, Bartholomew Close, London. We shall feel much obliged by our correspondents filling up and returning these schedules not later than May 15th, so as to enable us to complete our arrangements for the publication of the returns in our next number.

These returns of the prices obtained for forest produce in the various parts of the country are of the greatest interest to our readers, and we trust that we shall be favoured with a large addition to our list for this year. Looking over last year's returns we find that from many well-timbered English counties, such as Kent, Hants, Berks, Oxford, Herts, Derby, Lancaster, and others, there was no return sent; while of the thirty-three counties in Scotland, so famed for its well-managed woods and intelligent foresters, we only received eight returns; Perthshire, for instance, being a blank!

Ireland has not the same means and facilities for making numerous returns, although the *quota* from there might also be easily increased; but why the Principality of Wales, which possesses every means and facility, should only be able to forward a "brace" of returns is past comprehension.

There is certainly ample room for a large improvement here, and we trust that none who are in a position to help us, and benefit themselves and their neighbours, will neglect the opportunity which we freely offer them for doing so. The more numerous and complete the returns are the more valuable they become, and by their accumulation in a comparative form, much information of a really useful nature is imparted to our practical readers. Where all help a little, each one's share of the trouble is but slight compared with the advantages reaped by all, and there is not a forester in the country who cannot assist us more or less, if he will only try. The quotation of *average* prices and a few short explanatory notes are all that are required or expected, and we trust that these will be furnished to us freely at the earliest convenient date possible.

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THE praiseworthy endeavours now being made in many parts of the United States to reclothe the naked surface of the country with the umbrageous shade of forest trees of which it has been so ruthlessly denuded, deserve the attention of the inhabitants of other countries, where similar evils prevail. Aided and directed by the experienced counsel of such distinguished Arborists as Professor Sargent, Director of the Arboretum, Harvard University, Massachusetts, and the Hon. G. B. Northrop, many of the Western Railway Companies have begun extensive plantations along their line of route, chiefly for the supply of timber for railway purposes in the first instance, but ultimately these woods will no doubt realize a handsome income to the various enterprising companies who are leading the van in this necessary work. Before the great panic of 1873 several attempts at tree-planting had been made by railway companies, but none were successful, owing to bad management and an improper selection of trees, combined with gross neglect and the necessary precautions to prevent fires, the result of the trees being planted too near the line of the railways. But, lately, an earnest has been given of the great value of the Harvard Arboretum in promoting the material interests of the country. Within the last two years, under the inspiration of that institution, conducted by Professor Sargent, more systematic attempts at railway tree-planting have been made in Kansas by the Fort Scott and Gulf Railway Company, several hundred acres having already been planted, and during the present winter a Boston capitalist has contracted for the planting of 560 acres of prairie land in eastern Kansas. This contract is made with the Messrs. Robert Douglas and Sons, of Waukegan, Ill., the largest and most successful raisers of forest-tree seedlings in the United States, and is somewhat peculiar and novel in its provisions. They agree, at a certain price per acre, which would differ, of course, with different conditions and location, to break and plough the land, prepare it for planting, plant not less than 2,720 trees to the acre, and cultivate these until they shade the ground and so require no further cultivation to keep down the weeds and strong natural grasses—the great drawback to all prairie tree-planting. At the end of this time, probably in about four years from the time of planting, the plantation will be delivered over to the owner, one cent a tree being deducted from the final payment for every tree less than 2,000 to the acre delivered, only trees at least six feet high at the time of delivery being counted. The advantage of this plan, which is the one also adopted by the Fort Scott Railway, is that the trees will be carefully planted and attended to by experienced men, whose interest it will be to use the best plants, and to cultivate and care for them in the best manner, so as to be able to deliver the greatest number of trees in the shortest possible time, that they may get quick returns for the money invested in plants, planting, etc. Any plantation in which the trees are six feet high, and in which the ground is so shaded that weeds and stray natural grasses cannot grow is safe, and will require no further attention until the time comes for commencing to thin out the trees. This plan relieves the owner of the great risk always attending the early years of a plantation, and makes his investment practically safe. This plantation of 560 acres is to consist of 300 acres of the western Catalpa, 200 acres of Ailanthus, and 60 acres which will serve as an experimental ground on which will be tested trees of several varieties, to be selected by the learned director of the Harvard Arboretum. The western Catalpa, a native of the low lands bordering the lower Ohio, and the banks of the Mississippi in Missouri, Kentucky and Tennessee, is a rapid-growing tree, easily cultivated and producing timber which, although soft, is almost indestructible when placed in the ground, and therefore of the greatest value for fence posts, railway ties, and similar uses. The Ailanthus will grow with great rapidity anywhere, where the climate is not too cold for it, and in spite of its wonderfully quick growth, produces hard, heavy timber valuable for fuel, ties, cabinet work, or almost every purpose for which wood is used.

It is believed that this plantation will soon lead to the formation of others, both by the railway companies and by individuals, or corporations chartered to plant and own timber lands in the prairie States. An encouraging fact, and one which shows that public attention is being directed to the importance of providing for the future demand of such things is, that the Iron Mountain Railway Company, which runs for hundreds of miles through a heavily-timbered region, and possesses in its own lands some of the finest white oak in America, has also made a contract with the Messrs. Douglas to plant near Charleston, Mo., 100 acres of western Catalpa as an experiment. If the planting of trees is good policy for a railway running through a heavily-timbered country like Missouri and Arkansas, it will certainly pay for railways in Iowa, Nebraska, Minnesota and Kansas to do the same.

At the instigation of Professor Sargent, and facilitated by the postal regulations of the States, the Messrs. Douglas have adopted the convenient and expeditious plan of sending small numbers of seedling forest trees by mail. This is found to suit farmers and others of small means, fosters a taste for tree-planting, and gets people into the habit of planting a few trees every year. By this means 75,000 trees were sent out last year, not one of which, it is said, failed to reach its destination in perfect condition. The plan has proved so successful that this year it is expected that several millions of trees will be thus distributed throughout the United States.

The importance and expediency of extensive tree-planting is now fully recognised by many in the States. In several of the States large bounties are offered for the best plantations of forest trees of various kinds, at certain stages of their growth, and the land planted is also exempted from payment of taxes for a considerable number of years. The secretary of the Connecticut State Board of Education, Hon. B. G. Northrop, who is an enthusiastic arboriculturist, in stating that in Connecticut, in the last ten years, about £67,000 have been expended annually in building and repairing schoolhouses, says: "Wise and necessary as was this expenditure, had one-hundredth part of this sum been spent annually in planting trees and adorning the school-grounds, a still better result would have been accomplished in cultivating the tastes of our youth, leading them to study and admire our noble trees, and realize that they are the grandest and most beautiful products of nature, and form the finest drapery that adorns this earth in all lands. Thus taught, they will wish to plant and protect trees, and find in their own happy experience that there is a peculiar pleasure in their parentage, whether forest, fruit or ornamental—a pleasure that never cloys, but grows with their growth. Such offspring they will watch with pride, as every year new beauties appear. Like grateful children, they bring rich filial returns, and compensate a thousand-fold for the trouble they cost. This love of trees early implanted in the school and fostered in the home, will be sure to make our youths practical arboriculturists."

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The genial nature of the present spring has caused an early development of vegetation, which, in some favoured parts of the country, is said to be fully six weeks ahead of what it was at the same period last year. An early and healthy growth, unchecked by cold, is an important factor in the production of clean, sound wood in the bole of a tree; and the present season has opened well for a quick and vigorous growth of arboraceous vegetation. If followed by a warm summer and dry autumn, so as to thoroughly mature the season's growth, it will be interesting to note and compare the wood formed in such a season with the late, rank, sappy production of last year's growth. An important point may thus be solved, concerning the influence of climate on the production of timber of a certain quality in various forest trees, and thus assist in the selection of the most useful kinds for planting in a dry or a wet climate.

With weather so favourable for carrying on forest work, it ought now to be in such a forward state as to allow all hands to be actively employed at oak barking, the best season for which is of short duration and likely to be soon over this year. The richest and best bark, for which the highest price can be obtained, is stripped from the tree immediately after the sap commences to flow freely, and at which time the bark rises most easily. No time should, therefore, be lost by the forester in having as much as possible of the barking done while the bark is in its best condition. Every preparation should be made beforehand, and the work pushed on with energy and dispatch, so as to secure a first-rate article, and the highest market price. To obtain these in our variable climate is no easy task, and the forester to be really successful must be well supplied with all the necessary appliances for the proper curing and storing of the bark. Portable drying sheds and a plentiful supply of tarpaulins are seldom seen, although in most seasons a first-class sample of bark cannot easily be produced without them; and the damaged bark of one wet season, if properly saved by their use, would go far to repay their cost.

THE proper direction of the work and operations on the Home Farm is an important factor in the management of any well-regulated estate. This duty is often combined with the management of the woodlands, and the general superintendence of the estate; hence it is of much importance to the young and inexperienced practitioner to be able to compare his ideas with that which long investigation and careful experiment have taught thoughtful and experienced men to pursue. With the view of assisting the inexperienced in the management of the Home Farm, we have arranged with an able and experienced agriculturist and estate manager for a monthly series of articles on "The Home Farm," the first of which appears on another page of this number. Under this heading it is proposed to treat of the various operations and routine work for the current month, the buying and selling of stock and produce, the various items of estate work generally performed by the home farm establishment, and any other subjects connected with home farm and estate management to which it may be necessary to draw attention at any particular period of the year. By this means we hope to furnish much instructive information to our readers, and make a useful addition to the practical features of our pages.

PRIZE ESSAYS ON INJURIOUS INSECTS.—The Council of the Entomological Society has been authorised by Miss Ormerod to offer two prizes of £5 each, one for the best Essay on the life-history of injurious species commonly known by the name of "Pea Weevil" (*Sitones lineatus* and S. *crinitus*, &c.) This essay to give information respecting the eggs, larvæ, &c., and best methods of prevention. The other for the best essay on insect attacks upon pine or fir plantations, with special reference to weevils or saw-flies. A life-history of the insect or insects will be required. The essays to be accompanied by specimens and practical information bearing on the subject, and the prizes will be awarded according to the practical utility of the essays. Papers and specimens to be sent to the secretary of the Society before November.—*Field.*

THE GENUS SEQUOIA AND GEOLOGY.—At a recent meeting of the Helvetic Society of Natural Sciences, Professor Heer read a paper in the botanical section on the palæontological history of Sequoia. This genus is now represented by only two distinct species, forming the celebrated forests of big trees in California, and known to botanists as *S. sempervirens* and *S. gigantea.* Professor Heer finds that the genus attained its greatest development during the Tertiary epoch, though it was before largely represented in the Cretaceous. Between the two types above named, palæontological collections have furnished as many as twenty-four fossil species, of which number fourteen belong to the Tertiary and ten to the Cretaceous. The lower chalk alone furnishes five, two of which, strange to say, are closely similar to the surviving species (if not identical). Sequoia has not, as yet, been found in Jurassic formations, though these are rich in coniferæ.—*Garden.*

# Science for Young Foresters.

By ALFRED J. BURROWS, Pluckley, Kent.

*(Continued from page 764.)*

The Classification of Plants.—The necessity for a systematic classification will be obvious when we consider that there are already included in the catalogue of the botanist more than 150,000 species of plants, and that the floras of many regions in America, Africa, Australia, India, and China are still very imperfectly known.

The natural divisions of plants are Herbaceous, Shrubs, and Trees. *Herbaceous* plants have succulent, juicy stems, and they are either annuals, biennials, or perennials. These are either multiplied by dividing the roots, by means of offsets, by cuttings taken from the side shoots, or by seeds. The stems of herbaceous plants consist chiefly of cellular tissue, and these for the most part die down to the ground annually.

*Shrubs* are ligneous or woody-stemmed plants which have generally several parts of nearly the same thickness springing from one root. Their period of life is not often more than from 40 to 50 years.

*Trees*, properly so called, are single-stemmed as they rise from the soil, though many of them fork out immediately afterwards. When these are exogens (of which more hereafter), their ages are generally calculated pretty accurately by the number of concentric rings which exist between the pith and the bark. But this method of computation, though sufficient for ordinary purposes, is by no means infallible. In a warm, early spring the sap is soon set in motion, and if cold weather follows vegetation becomes checked, though it afterwards gets a second start, in consequence of which the appearance of the trunk at the end of that season will indicate two years' growth. Sometimes a second growth commences at midsummer; and this is very frequently the case with the oak and the elm; so that it is possible for even a third layer to be formed in the same year. Again, during a warm or a very mild and moist winter the growth of the tree occasionally receives no check, so that the increase of two years may form only one ring upon the trunk.

The length of life of any tree depends very much upon soil and situation. When the natives of mountainous regions are planted in sheltered spots and upon a rich soil they grow rapidly, and are sooner

FIG. I.

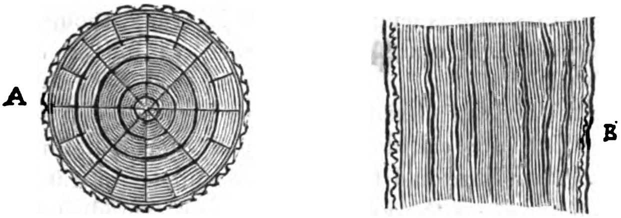


FIG. II.

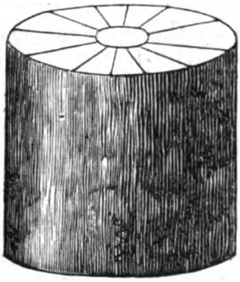


FIG. III.

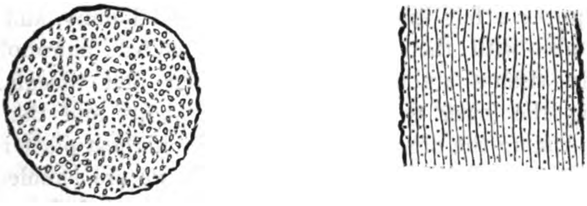
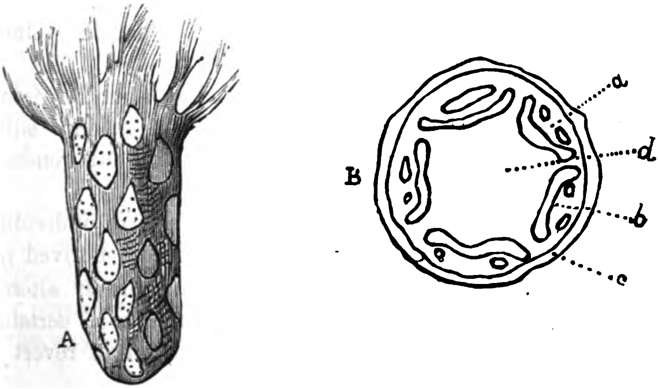


FIG. IV.



exhausted. The timber also is of less value on account of its imperfect lignification. But when the native of a lower region is placed upon a more elevated site and in a poorer soil, if it survives at all the period of its existence is lengthened, and its trunk, though smaller in size, produces tough and durable timber, as in the case of the Highland Oak.

Various methods of classification have been adopted by botanists, some of which are called artificial, and others natural systems. *Artificial Systems* have had their chief expounder in Linnæus, whose method is founded on the essential organs of reproduction in plants. With him plants are divided into flowering and flowerless: the former, called also *Phanerogamia,* he arranges in twenty-three classes, whose characters are determined by the number, position, and the length and connection of the stamens; the latter, called *Cryptogamia,* he arranges under twenty-four classes, which approach more nearly the divisions under the natural system. The first comprehensive *Natural System* was that of Ray in 1682. He also separated flowering and flowerless plants, and arranged the former under the two heads of Dicotyledons and Monocotyledons. Thus he laid the foundation of the system which has been still further elucidated by the labours of Jussieu, De Candolle, and Lindley.

The arrangement of plants according to the natural system is one which requires a fair knowledge of structural botany, and also some acquaintance with the theoretical part, called morphology. The elementary tissues are divided into cellular and vascular, the one composing the lower tribes of flowerless plants and the other the higher. Among the organs of nutrition the highest place is assigned to the embryo. By an examination of this we are enabled to divide plants into Acotyledonous, Monocotyledonous, and Dicotyledonous. Upon an examination of the secondary organs of nutrition we find the stems of cellular or thallogenous plants are veinless; the fronds of acrogens have a forked venation; endogens have parallel-veined leaves, while those of exogens are reticulated.

The usual divisions of plants consist of classes, orders, genera, and species, and these are again subdivided,—the first into sub-classes, the second into tribes and sub-tribes, the third into sub-genera, and the fourth into varieties.

A *species* has been described as an assemblage of individuals presenting certain constant characters in common and derived from one individual stock. What are called varieties are simply alterations in species, and though careful cultivation ensures to a certain extent the permanence of these, through neglect they often revert to their original stock.

*Genera* are species nearly related, as the dog rose, the Scotch rose, the China rose, and the sweetbriar, all of which produce a fruit called the hip. The oak also includes nearly 200 species distinguished by the acorn.

*Orders* are groups of genera which bear a strong family likeness; thus pines, larches, and firs, being different genera, but all producing cones, are classed under the order Coniferæ. The oak, the hazel, the beech, and the chestnut are all arranged under the order Cupuliferæ, on account of their producing the cupule of the acorn, which is also known by the name of husk in the filbert, chestnut, and beechmast.

*Classes* are collections of orders which agree in all important characters, such characters being permanent, and therefore called essential.

By the natural system of De Candolle, plants are arranged under three principal heads:—Exogens, Endogens, and Acrogens. In the two former the organs of reproduction are obvious, hence these flowering plants are called Phanerogamous, from the Greek word *phaneros*, which means conspicuous. In the last the organs are obscure, hence they are called flowerless or Cryptogamous, from *kryptos*, which means concealed.

EXOGENS have their woody and cellular systems separated, the former being arranged round the pith in zones of a concentric form. All plants belonging to this class have branch-veined leaves. Their stems have a central pith, a ring of wood, and a covering of bark. The lines radiating from the pith to the bark are called medullary rays. In this class of plants the embryo of the seed is dicotyledonous. The stems thicken as they grow older, and consequently both trunks and branches are more or less conical. The numbers of the parts in their flowers are generally indicated by powers of 4 or 5. The European Flora consists mainly of Exogens, and, indeed, nearly all plants growing here in a wild state belong to this class.

In Fig. I., A shows a horizontal and B a vertical section of the trunk of an Exogen. The central pith extends from the roots through the trunk to the ends of the branches. This is generally solid, but in umbelliferous plants it adheres to the inside of the rapidly-expanding cylinder, so that an empty tube is produced. The medullary rays or processes, by means of small points or slits, radiate from the pith outwards. These processes cut up a section of the wood into a number of wedge-shaped pieces, the broadest parts of which are next the bark of the tree. The office of these rays is to enable the descending sap to reach the inner portion or heart of the tree. An illustration of these processes and of the way in which they communicate with the pith is given in Fig. II.

Exogens, or outward growers, are divided into four sub-classes.

1. *Thalamifloræ,* in which the flowers are furnished with both a

calyx and a corolla, the latter consisting of distinct petals. Upon these the stamens are hypogynous, that is, they are united to the sides of the ovary.

2. *Calyciflorœ*, which generally have both calyx and corolla, the petals of the latter being distinct. In these the stamens are perigynous, or arranged round the ovary, or epigynous, that is, arranged upon the ovary. This sub-class is commonly divided into Polypetalæ, having separate petals, and Monopetalæ, with united hypogynous petals.

3. *Corolliflorœ*, having flowers furnished with both calyx and corolla, the latter consisting of united petals.

4. *Monochlamydœ*, whose flowers have no corolla, and oftentimes no calyx. These are called apetalous.

ENDOGENS, or inward growers, have parallel-veined leaves, the veins either passing from one end of the leaf to the other, and parallel with the midrib, or diverging towards the margin, when they are called curve-veined. Where the veins continue their branchings with ramifications getting smaller and smaller, and gradually growing into one another, the leaves are called reticulated or netted-veined. The stems of endogens are confused masses of pithy matter, in which there is little or no distinction of parts, the pith, the fibre, and the bark or outer covering all blending. Sections of this kind are shown in Fig. III. Such stems do not thicken much, but they elongate with age. Their form is more cylindrical than conical, and internally they become more woody as they get older. The parts of their flowers are commonly some power of 3. Endogens are so named because the woody matter is formed upon the interior of the trunk. Theophrastus speaks of this difference in writing of the palm tree ("Hist.," I. 8). The woody bundles of which the trunks consist are developed from the interior to the exterior. Endogens as a class are tolerably uniform in structure. The common cane and the asparagus afford typical illustrations of their modes of growth.

This class of trees has spiral vessels, stomata, generally a parallel venation, and flowers with stamens and pistils. It is subdivided into

1. *Petaloidœ*, all of which have parallel-veined leaves;
   - (*a*) *Epigynœ*, having flowers with stamens and pistils, and an inferior ovary;
   - (*b*) *Hypogynœ*, with stamens and pistils, and a superior ovary;
   - (*c*) *Incompletœ*, having incomplete flowers, with no proper perianth, or with verticillate scales.
2. *Glumiferœ*, which have a parallel venation, and whose flowers consist of imbricated bracts or glumes.

ACROGENS, or summit-growers, are flowerless plants which multiply by means of spores. They do not increase in diameter, but elongate with age. Acrogens are divided into two classes, the Acrogens proper, which have a distinct stem with branches and leaves, and Thallogens, which have no distinct stem, but only a cellular expansion or thallus. The higher orders have stomata. Generally speaking these are plants of small stature, but in ferns they sometimes attain the height of trees, having a simple stem. Whenever they branch naturally they do this in a forked manner. The common equisetæ, or horsetail, is a well-known type of these plants. In the tree-ferns of New Zealand and Van Diemen's Land their stems rise to a height of 40 or 50 feet. Their growth is accomplished by the petioles of the leaves being joined together, and consequently the wood resembles neither the concentric circles of the exogen nor the fibrous substance of the endogen, but a succession of zigzag layers, derived from the footstalks of decayed leaves of a large size.

In Fig. IV., A represents the scars of the leaves upon the outside of the trunk, and B the transverse section of the stem, with its bundles of vessels at (*a*) and (*b*), irregular in form, dark outside and pale within; (*c*), outer layers of cellular tissue, and (*d*), central cells, in the place of which there is sometimes a cavity.

Within the limits of these pages it is impossible to enter upon a description of the various orders under which plants and trees are arranged. These the student will find systematically classified in any one of the numerous treatises upon botany which have appeared of late years, and in none more clearly than in the "School Botany" of Dr. Lindley and the elementary works of Professor Balfour. The following classification of an important order of forest trees will give some idea of the manner in which the subject is treated by the former.

### ORDER.—SALICACEÆ.

The downy seeds of willows and poplars growing at the bases of leathery two-valved capsules, give such plants a mark of recognition which cannot be mistaken. The most northern woody plants known are the willows called *Salix artica* and *S. polaris.* This order is valuable both for its timber and for economical purposes. The bark is astringent, tonic, and stomachic. That of *Populus tremuloides* in the United States and of *P. tremula* and *P. alba* in Europe is known as a febrifuge. Salicine, a substance used to arrest the progress of fever, has been prepared from *S. fragilis, pentandra, Russelliana, vitellina,* and *purpurea* in Europe, and from *eriocephala, nigra,* and *conifera* in the United States. The buds of *S. nigra, balsamifera,* and *candicans* are used in compounding an ointment, for tumours, wounds, and burns. Osiers generally are useful in wickerwork, and the wood of the sallow makes good charcoal. *S. alba* is found serviceable for cricket bats, and the aspen for arrows. Some of the poplars are also used for turnery, for flooring boards, for wheeling planks, and for wheelbarrows for rough work.

Flowers unisexual. Stamens distinct or monodelphous. Ovary superior, one or two-celled, ovules numerous, style 1 or 0, stigmas 2. Fruit coriaceous, one or two-celled, two-valved, many-seeded. Leaves alternate and simple. Stipules deciduous or persistent. Trees or Shrubs.

I. SALIX.—Flowers diœcious, seldom monœcious. Catkins consisting of imbricated bracts. Stamens from 2 to 5. Fruit a one-celled follicle. Seeds comose.

(1) *S. caprea* (Sallow). Leaves roundish ovate, serrated, waved, pale and downy beneath. Catkins oval. Fruit swelling. A small tree.

(2) *S. fragilis*. Leaves ovate-lanceolate, pointed, serrated throughout, very smooth. Ovary ovate. Stigmas cloven, and longer than the style.

(3) *S. Russelliana* (Bedford Willow). Leaves lanceolate, tapering at each end, serrated throughout, very smooth. Ovary tapering and stalked. Woods. A tree.

(4) *S. purpurea*. Branches trailing, decumbent. Leaves partly opposite, obovate-lanceolate, serrated, very smooth, narrow at the base. Stamen 1. Woods. A small shrub.

(5) *S. vitellina*. Leaves lanceolate, acute, smooth above and somewhat silky and glaucous beneath. Stipules minute, lanceolate, deciduous, and smooth. Osier grounds. A tree.

(6) *S. alba*. Leaves elliptic-lanceolate, pointed, serrated, silky on both sides. Stamens hairy. Woods. A large tree.

II. POPULUS. Diœcious. Catkins cylindrical, with lacerated bracts. Stamens from 8 to 30. Seeds comose.

(1) *P. nigra* (Black Poplar). Leaves deltoid, pointed, serrated, and smooth on both sides. Catkins all lax and cylindrical. Stigmas 4, simple, spreading. Woods.

(2) *P. alba* (the Abele Poplar). Leaves lobed and toothed, somewhat heart-shaped at the base, snow-white and downy beneath.

(3) *P. canescens* (the White Poplar). Leaves roundish, deeply waved, toothed, hoary and downy beneath. Stigmas 8. Woods.

(4) *P. fastigiata* (the Lombardy poplar), branches very erect, forming a long cylindrical head. Leaves deltoid, unequally serrated, smooth. Plantations.

(5) *P. tremula* (the Aspen Tree). Leaves nearly orbicular, toothed, smooth on both sides. Footstalks compressed. Young branches hairy. Stigmas 4, erect. Woods.

(*To be continued.*)

# Are Trees Injured or Benefited by the Decomposition of the Prunings which may surround them?

By D. McCORQUODALE, Forester, Dunrobin, Sutherlandshire.

The reading of the following suggestive paragraphs in Mr. A. J. Burrows' interesting articles, which appeared in the January and March issues, led me to propose the above questions.

"To keep," he says, "growing trees in a healthy state, it is especially necessary that all prunings from the fallen trees be either removed or burnt up, and not allowed to decay in the plantations. Attention to this point is even more necessary where all the trees are of one kind, than where the plantation contains a great variety. The gases arising from the decomposition are in no case beneficial to the standing trees, and in most instances they prove injurious."

"All the *débris* of broken branches should be gathered and carted away from the plantations. The fœtid gases generated where these are allowed to decay among the trees, prove highly injurious to the growing crop."

As a proof that Mr. Burrows has not been singular in his opinions, we may quote the following from the Transactions of the Scottish Arboricultural Society.

In Vol. I., published in 1858, Mr. Robert Philip, then forester to J. Chalmers, Esq., of Oldbar, says, "Nothing looks more trashy than tops and branches lying about in the wood, and such rubbish encourages vermin and insects injurious to the growing trees. The decay of such rubbish, by the gases arising from it, also proves detrimental to the health of trees, especially if the plantation be composed of one kind only; but if it be a mixed plantation, the decay of refuse will prove beneficial, as such refuse of hardwood proves a natural manure to the fir tribe, and *vice versâ*. Objections may be raised on the score of expense in taking out all this rubbish, in coal and peat districts, where firewood will not sell at any price; but although it should have to be burnt on the ground, I am prepared to assert that the better health of the plantation will repay all expenses; and where fuel is scarce, it not only refunds the outlay, but it will leave a good profit."

Mr. William Gilchrist, forester, Cluny Castle, says, in Vol. V. published in 1869: "Where the preservation of game is considered important, these branches may be put up into small heaps to form artificial shelter, but they ought not to be left scattered over the ground, as they tend to encourage the growth of a number of the fungus tribe, all of which are detrimental and injurious to the growth of trees; and in these neglected plantations it is of the greatest importance that as much pure air be admitted as possible."

Mr. William Thomson, deputy surveyor of Chopwell Woods, Durham, says, in Vol. VI., published in 1871: "Were it not that it encourages the increase of vermin, we are strongly inclined to believe that all the branches and smaller spray of thinnings ought to be left on the ground, as when decomposed they are converted into the best natural manure for the trees left standing. This is especially the case with respect to mixed plantations of any kind. Some individuals believe that where decaying branches and leaves are allowed to abound, every encouragement is given to the growth of noxious insects, which soon affect, and ultimately destroy the standard trees. Our own experience never discovered any such result, and, unless in exceptional cases, we have never known insects prove fatal to otherwise healthy trees. It is rather when the trees, from some other cause, become unhealthy, and then constitute the proper food for such insects, that these adhere to them, and to a certainty facilitate their decomposition. Where the science of entomology is properly understood, we believe this inference would be found to be very fairly deducible."

Mr. William Tivendale, forester, Houston, Paisley, in Vol. VII. published in 1873, says:—"As a proof that the decaying branches of Scotch fir trees are not only a harbour for, but the origin of beetles, I will give an instance. Six years ago I lifted as many Scotch firs and spruces, out of a plantation which required thinning for the first time, as was sufficient to plant an acre of ground for a screen; after these were lifted I thinned the plantation, and in consequence of other estate improvements going on, there was not time to burn the branches, and they were left to rot on the ground. I never detected the slightest appearance of beetles in this plantation previous to the thinning nor after it till this spring, when I found many of the side branches had been attacked by the large beetle—*Hylobius abietis*. If the beetles had been on the trees previous to this thinning, those that were lifted would likely have had them too, but upon those there was not a beetle, nor the trace of a beetle, to be found. Therefore I advise all Scotch fir rubbish to be gathered and burned up as a great means of getting rid of beetles."

Robert Hutchison, Esq., of Carlowrie, says in Vol. VII., published in 1874:—"But while thus presenting the dark side of this picture of Nature in her forest economy, it should also be borne in mind that although a long catalogue of most destructive little insects has been named, there is also a very numerous class of insects which are not only not detrimental to the coniferous or even hardwood trees, but are directly beneficial to them, and especially to the pine tribe, in destroying, and thus keeping in check, other insects which are in themselves destructive. Many of the ichneumon flies destroy whole acres of caterpillars infesting fir trees; and without the aid of such small predacious and parasitic allies, destructive insects would increase to such an extent as to render all forest labour unavailing. It is well known that while there are multitudes of noxious insects devastating whole forests, there are also many useful little animals which by their operations may be said to act as the good genii of all trees, and chiefly of the coniferous tribe. By diminishing the numbers of the injurious insects they check their otherwise too rapid increase.

"The first suggestion that naturally falls to be offered, with the view of preventing, or at all events of retarding, the attacks of predacious insects, is the entire removal, after felling or thinning any plantation or strip, of all brushwood, refuse, or root stumps, which may be left. Indeed, the instant transport of these outside the wood, and their immediate consumption on the spot, is the first safeguard which can be suggested for healthy plantations. In the case of woods where insect attacks have become apparent upon silver firs, Scots firs, or other common nurses, the immediate felling and removal for burning of the infected victims may tend to stay or lessen the plague. Paring off the grass all round infected trees, to the distance of a yard on each side, and burning the turf along with the diseased plant, is also a good and frequently an effectual remedy."

Mr. Malcolm Dunn, the Palace Gardens, Dalkeith, Edinburgh, says in Vol. VIII., published in 1878:—"Plants, like animals, are subject to numerous diseases, both functional and organic, and they arise from various causes, some being constitutional and hereditary, but frequently, on the other hand, many of them are induced by bad food, imperfect nutriment, a vitiated atmosphere, want of light, the attacks of cryptogams, and other causes, for which in many cases effective remedies are known, and in all of which some likely remedy can be suggested. The study of the diseases of trees is essential to their good cultivation, for although in many instances perhaps but little can be done toward arresting disease in any individual tree, much may be done by proved experience and the judicious use of rational means in preventing the spread of those which are infectious or contagious, and much more by guarding against those conditions and contingencies which induce disease in plant organisms.

"We know that many of the numerous genera of cryptogams are more or less injurious to plant life, and one very important class of diseases amongst trees and timber arises from the attacks of parasitic fungi. To illustrate the dangers arising from the attacks of fungi upon trees, I will describe an instance which has come under my own notice of the fatal injuries inflicted by them.

"In a small mixed plantation of ash, Spanish chestnut, hornbeam, poplar, willow, and hazel, which was planted in 1857-58, upon ground that had been cleared two years previously of a crop of heavy oak, ash, elm, and beech, and in which all the old stumps and roots were allowed to remain, the ash, poplar, and willow began to fail in 1861, and by 1863 there was scarcely a plant alive of any of them upon an area of about six acres. On pulling up and examining the dying plants, I found the roots were covered with the spawn of fungi, which permeated the bark and alburnum with a perfect web of white threads, and as the plants decayed penetrated their wood and hastened its rapid decomposition. The mycelium in many cases reached a height of from two to three feet up the stem of the young tree before the top was quite dead; and it could often be seen bursting the bark at the base of the stem, and displaying a complete network of white threads of spawn inserted between the bark and the wood. A few of the hazels were affected with the fungus and died, but none of the Spanish chestnut or hornbeam appeared to suffer in the least, although they were intermixed throughout the plantation with the other kinds that were killed by the fungi; hence it would appear that some species of trees are proof against the attacks of certain fungi which are fatal to others.

"Of the various genera of fungi which attack the heartwood of living trees, causing heart-rot or 'pumping,' the primary cause of their attacks is generally ascribed to exhaustion or weakening of the vital force of the tree, from the poverty or ungenial nature of the soil, the severity of climate, or the neglect of timely thinning and consequent overcrowding, all of which are injurious and debilitating in their effects, and render plantations suffering from them more liable to become the prey of fungoid diseases. The only cure known for the attacks of heart-rot fungus is to cut down and clear away every infected tree, burning all diseased parts so as to prevent as much as possible the spread of the fungus spores. Careful and judicious selection of the trees suitable for the locality, and which are known to suit certain soils and climate, a due and proper preparation of the ground before planting, efficient shelter and protection where such are necessary, and a regular and systematic attention, to the pruning, thinning, and other operations necessary for the health of the trees, are the best preventives of heart-rot."

Let us now examine our subject under the following heads :—

1st. The injuries done to growing trees by gases arising from decaying tree matter. Mr. Philip appears to be at one with Mr. Burrows in thinking that the gases arising from the decay of the rubbish of one kind is injurious to the healthy growth of the same kind of tree; but as these gentlemen do not give the facts which led them to form these opinions, we may be excused if we assume them to be the following.

One of the great questions of our day is the sanitary condition of our crowded cities. The gaseous exhalations arising from the decomposing excreta of so many people, so poisons the atmosphere with carbonic acid, ammonia, and other gases, which cause a stupefying derangement of the respiratory organs, directly in proportion to the amount present in the air; and also with myriads of decaying germs, ready to be inhaled and lodged in the system, to poison the blood and cause dangerous illnesses; hence arises the necessity of perfect drainage, and the various other means of purifying the air. Farmers maintain that cropping the same land always with the same kind of crop, wheat for instance, exhausts the soil; but if cereals are cropped alternately with turnips, grass, and pasture, its natural fertility is in a great measure preserved. What, therefore, could be more natural and logical than to suppose that because the gases arising from decaying animal matter is so very hurtful to man, dead decaying forest-tree matter must be hurtful to trees; and especially so where there is only one kind, because they must be more apt to load the surrounding air with one kind only of poisonous matter, and must likewise exhaust the soil of the nutriment suitable to one kind, compared to where there are many kinds.

2nd. Decaying rubbish is said to encourage the breeding of injurious caterpillars and beetles, of which Messrs. Hutchison, Philip, Thomson, and Tivendale so strongly complain, especially Mr. Hutchison, who gives unquestionably strong facts in support of his views.

3rd. Cryptogamic plants are said to be injurious to forest trees, about which Mr. Gilchrist speaks, and of which Mr. Dunn gives an example. Amongst other valuable information he gives on the subject is, how the want of air and light, arising from imperfect thinning, encourages the growth of these injurious plants.

4th. These gentlemen appear to think the expense they purpose incurring, in all the clearing they propose, to be but a very small matter, and that all the benefits accruing therefrom would be greatly in excess of the cost.

Let us look at the other side of the question, and see how far these gentlemen, and others of their school, have got facts which can stand handling, to support their views, and not visionary ones, or theory only.

With all due deference to those who hold different opinions, I maintain that the decomposing refuse of trees, in place of being injurious, is highly beneficial to the live trees growing amongst them, of whatever sort they may be, and especially so if all of one kind; and I would as soon advise my employer to pay for carting away so much of the soil which overlay their roots, as advise him to pay for removing and burning an equal weight of tree refuse; and in giving my reasons for this, we will examine them by the aid of the four heads through which we looked at the other side of our subject.

(*To be continued.*)

## THE BEST TIME TO PLANT TREES.

There is nothing, perhaps, on which most of us are more prone to dogmatize than on the subject of tree-planting. If we plant in spring and the tree dies we are very likely to attribute the loss to the season, and decide never to plant in spring again. Or, if we plant in fall and have no success, then we are quite as decided against fall-planting.

There is no doubt but that fall-planting has risks from which the spring is free. Trees which have not been transplanted, but have grown well in the one place for twenty years, have been destroyed by the dry cold winds of winter. Not only evergreens, such as arborvitæ, balsam fir, hemlock spruce, and even Norway spruce, but deciduous trees, as cherries, tulip-trees, oaks, and many others with the best-established reputation for hardiness. And then small things besides the risks of those frosty winds to dry up the little sap in them, are usually so much drawn out as to be seriously injured. The one great argument in favour of fall-planting is that where the trees escape all these risks it generally grows much stronger and more vigorous in spring than one planted at that time, as the bruised roots seem to heal, and the tree is ready to push out in the spring almost as well as many not transplanted. It saves a year.

But, after all, spring with most people will ever be the favoured time.

The hot dry summer may come and destroy, just as the cold dry winds of winter may, and thus in some measure equalize the risk, but yet it is at this season that planting will be the most popular.

But there is one thing on which people need cautioning. A large number of persons start to plant as soon as the first bright sun shines through a snow-cloud, and before the earth is dry enough to powder about the roots. No matter how fine overhead, the earth should not be wet or frosty at the time of planting.

As a general thing the best time to plant trees in the spring season is just before the buds push, or even after they have started. This implies an active condition of the root, and it generally occurs at a time when the earth is in the best condition for working in about the roots. As evergreens push later than deciduous trees, their removal may be extended long into May.—*Germantown Telegraph*, U. S. A.

# The Deterioration of Scotch Pine.

It cannot be doubted that the question, "Has Scotch pine deteriorated in quality during late years?" requires still further elucidation. It is asserted in the recent issue of the Scottish Arboricultural Society's Transactions, at page 180, that subsoil has a good deal to do with the degenerate appearance of some Scotch pine plantations, and two cases are cited in support of this theory. Before accepting this, however, it might be advisable to investigate still further into the nature of the tree itself, also somewhat into the history of its cultivation in Scotland. In my estimation, no tree at present in cultivation is so accommodating as to soil and situation as the native Scotch pine. Provided the ground is drained, it will produce timber of the very best quality and dimensions on stiff, clayey soil. I have seen it luxuriating equally well on a sandy soil and subsoil, and on a tenacious clay, resting upon an equally tenacious bottom. Take, for instance, the light, sandy soil of Morayshire, where you can see a large extent of Scotch fir growing well, and on the other hand the tenacious clay of East Lothian, comprised in that belt of land intersecting the county from east to west—say from the village of Garvald to that of Pencaitland, where there are some fine Scotch fir growing. The timber, age considered, cannot be surpassed for weight and redness of quality, and growing too on a soil which taxes the genius of the very best farmer to work in certain seasons. With regard to Scotch pine assuming a coarse, naked habit at certain stages of their growth, may this not arise from the presence of too much moisture in the subsoil and not from any fault in the soil itself? I have seen, particularly after a severe thinning, on damp soil of this description the Scotch fir assume a weakly, straggling habit, and never regain its wonted vigour. The Scotch fir has a decided tendency to run to branches when allowed space, and that too on the very lightest soils; one of the most notable examples falling under my own observation was a plantation near the river Spey. Part of it for some purpose or other had got a very severe thinning at one time; the remains of large half-decayed branches pointing out in all directions from the stems bore ample testimony that the growth at one time had taken a lateral direction, and it was only after nature had time to partially work a cure that the plantation was beginning to start away with a vigorous upward growth. The native pine adapts itself readily to any climatic influence; if planted at a great altitude and on an exposed situation it lives to a great age, and remains perfectly healthy, though only arriving at a mere bush. In the same publication, at page 182, it is said that the "native Scots pine when planted in the south does not succeed well, except occasionally in moorish localities." I could point out some very fine Scots fir in the south of Scotland, and when it gets leave to mature, arrives at first-rate dimensions, but this part of the country has been long opened up to trade, hence the timber as a rule is much earlier cut. I am led to believe, however, that *Pinus sylvestris horizontalis* had a much wider geographical range in Scotland at one time than it has at present. There can be no doubt but that large tracts of it existed at a much earlier period in the south of Scotland. Where did the supply of timber come from that built such towns as Edinburgh and Leith previous to the beginning of the sixteenth century—for it must be borne in mind that prior to that date they were largely built of wood? There are houses still standing supposed to have been built about that time, and wooded with Scotch fir; indeed, if I mistake not, Holyrood Palace, which was re-roofed lately, was formerly timbered with Scotch fir, which had been obtained somewhere in the neighbourhood, having stood for upwards of two hundred years. Now, since the north of Scotland has been opened up the same as the south, and where the process of clearing is being carried on to a large extent, the seed of the true variety will every year become more difficult to get, and Scotch fir may ultimately in many cases decline in quality in the north as it has done in the south. The selection of seed is everything in this question. In the south, where this has been carefully attended to, the reward has been ample. The complete success of many fine Scotch fir woods in the south of Scotland can be traced in the first instance to the care bestowed upon selecting the true variety, which can only be secured in any quantity from the natural forests in the north.

A correspondent in this JOURNAL, at page 772, Vol. III., in treating upon this question, says that "not being able to understand why foreign Scotch fir should not succeed in this country as well as foreign larch, &c." It might not be out of place here to mention that there is such a thing in forest nosology as the "larch disease;" the disease is clearly traceable to the effects of our climate upon this foreign plant. It is exactly the case with the continental Scotch fir also; it is not suited to our climate and can never be compared with the native, the one which Nature has with her own unerring hand planted as the tree of the country. Some of the foreign Scotch fir, however, is not so unsuitable as others, but the best of it should be rejected unless for planting on dry, sheltered ground. Having had some experience of its early treatment in a small way (there being a home nursery of two acres under the writer's charge), I would reject it for no other reason than the percentage of deaths which occur in the nursery if the season is wet. A great amount of this seed is imported every year; it is a regular trade. I could buy it at Hamburg by the ton at a tremendous reduction compared with our own. I believe that the importation of seed is the chief cause of the languid, degenerate appearance of many Scotch firs. In plantations of twenty and thirty years of age it could be distinguished this winter at a considerable distance, growing along with the native pine, with the seed of which it had been mixed, by its brownish tinge and straggling head. The continental Scotch fir does not succeed either at a high altitude; indeed, I think in its native habit it does not reach to anything like the same high range as our own. The true native Scots pine is the safest tree to plant—it is the tree of the country—it is exempt from all climatic influences or diseases. It has been said that Scotch fir will succeed on any kind of soil, and in spite of all the cry about soil, subsoil, and climate, I have seen nothing yet to refute this statement.

W. W. R.

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**Eucalyptus Globulus in South Wales.**—About this time last year we sowed a quantity of seed of this Gum Tree. The result was a good batch of young plants. Last May numbers of them were planted about the pleasure grounds here, the soil in nearly every instance being different. All were the same height at planting time. One planted in clay is eighteen inches high, with no side branches. Another planted in a wet, marshy place is two feet high, with no branches. Another planted amongst a quantity of gravel is 2¼ feet high, with few branches. Another planted under the trees in similar soil is over three feet high. Two others planted in the centres of a bed of Pelargoniums and Roses in rich soil have grown nearly seven feet high, and they are bushy in proportion. This tree is said to be of very rapid growth, but this evidently depends very much on the character of the soil in which it is growing. How the frost has affected them cannot be rightly judged until spring.—J. Muir, *Margam*, in the *Journal of Horticulture.*

**Golden Hollies in Hedgerows.**—A few more winters such as the present, when one hears from all sides of the destruction of shrubs and evergreens, would probably cause us to think more than ever of the hardy evergreens, among which the Holly is so remarkable. In the district of the Surrey nurseries I was lately very much pleased to see the beautiful effect of grafting the variegated golden Hollies on the common kind growing in hedgerows. Such a practice might be extended to private places,, as, when judiciously done, and not overdone, the effect is bright and novel. It is surprising such work is not oftener illustrated than it is in private and botanic gardens.—R., in the *Garden.*

# Permanent Pasture.

By D. SYM SCOTT, BALLINACOURTE, TIPPERARY.

When pasture has become run out through the artificial grasses having become exhausted, and the natural grasses degenerated into weeds, the proper course is to break up the field, clean and dress it, before laying it down again as permanent pasture. There are different methods recommended for renovating worn-out grass land, but to get it into good heart, free from weeds and wireworm, there is no system equal to cropping. Of course the first preparation is draining. Stagnant water lodged in the soil or subsoil sours the nutritious grasses and produces noxious and poisonous weeds, which often generate dangerous and fatal disorders among live stock. It should be borne in mind that no matter how much rain may fall, it never hurts where there is a proper system of under-drainage to carry off the water as it soaks through.

When the field has been cropped with oats the stubble ought to be ploughed in autumn, and in spring well grubbed. The grubber is an excellent implement of husbandry, as it breaks up the subsoil without bringing it to the surface, and turns out the weeds. A green crop should follow the oats. As this crop, whether turnips, mangolds, carrots, or other root crops, is gathered off the field, the plough ought to be kept going so as to turn into the soil all the leaves of the green crop, which are first-rate fertilisers.

Many farmers are in the habit of following this crop with grass seed, but it would be advantageous to take another crop of barley or white oats, and afterwards another green crop, preparing the ground as already described. This system of cropping provides greater facility for cleaning the ground of weeds, &c.

Instead of the common plough use the double mould, and plough the field into drills immediately the green crop is cleared. In this state it will remain all winter, and being open to the action of frost, will secure a powdery soil in spring. When grass seed, without a grain crop, is to be sown, the field should be harrowed during the month of April, then ploughed and grubbed. After this a few runs with a harrow, followed with a clod-crusher, will give a fine pulverized surface for a seed-bed. Great care must be taken not to sow grasses as long as there is a risk of frosty weather. It is preferable to delay a week or ten days the sowing, so as to lessen the risk of being caught with black frost. There are different mixtures of seed for different soils, but the great point is to get clean, plump, and fresh seed, not old or musty. Along with the grasses may be sown three or four pounds of rape, which comes in very early, and makes a fine fodder plant for hoggets in autumn. Harrow the seed with a light harrow, and roll, using a heavy roller.

Although grass seeds are often sown by themselves, still they will do as well if sown along with a grain crop, barley or white oats. When a grain crop is sown with the grasses it should be sown and harrowed in by itself, as it requires a heavier covering than the grass. The latter may be sown a fortnight after the former. When ordering grass seed it is well to state with the order what is the nature of the soil, and allow the seed merchant to prepare the mixture for sowing. In buying seed never deal with obscure or doubtful houses. Select a house of standing, and if a trifle more has to be paid for the seed, there is the satisfaction that the material is genuine.

As much depends on laying down permanent pasture properly, it would be advisable for small farmers to consult with those of their neighbours who may have had considerable personal experience of the work, and who could assist them very much in regard to describing the quality of the soil for the ordering of the seed.

## SWALLOWS AS FARMERS' FRIENDS.

A WELL-KNOWN naturalist, M. Florent-Prevort, who has been engaged for a series of years in making observations on the contents of the stomachs of various insectivorous birds, recently communicated to the French Senate the following interesting details in the food of swallows. He examined with the utmost care the stomach-contents of eighteen of these, which he captured for that purpose at different periods of the season, with the results here appended. In the stomach of a swallow killed on April 15 he found 422 insects; April 19, 649 insects; April 27, 301 insects; May 1, 704 insects; May 4, 660 insects; May 18, 680 insects; May 29, 300 insects; June 3, 420 insects; June 14, 244 insects; June 28, 400 insects; July 11, 420 insects; July 20, 501 insects; July 24, 500 insects; August 5, 742 insects; August 19, 600 insects; and August 29, 384 insects. The eighteen birds together, therefore, devoured no less than 8,390 insects, which were recovered undigested, or at the rate of 466 each per diem; and it must be remembered that these probably represent but a small portion of the total number they had eaten during the day. When we reflect that among all this mass of ingested insects there was not a single grain of corn, or the least particle of fruit, or a trace of any vegetable *débris*, we have some slight conception of the invaluable services which these little creatures render to agriculturists and fruit-growers.—*Farmer.*

# A Substitution for Pitting in Planting.

By J. W. BARRY, M.A., Fylingdales, Whitby.

I HAVE read with much interest the discussion on the costs of planting and the methods used. I observe that, putting trenching on one side, pitting is spoken of as the accepted method of preparing the ground for planting, though attended with acknowledged disadvantages: *first,* comparative costliness; and *second,* injury to plants in certain soils owing to the retention of water as in cups.

As the season for planting is now nearly over, and that for preparation is coming on, and as I may be able to benefit many intending planters, I think it worth while to write from here (Corsica) to say that I have been practising for the last two years a method which obviates at least one of these disadvantages, and has a balance in its favour in regard to the other. In the course of somewhat extensive planting for ornament, I was much disgusted at the ordinary method of pitting, and set about devising something to take its place, without either going to the expense of trenching, or trusting to the chances of notching. It appeared to me that if the pits could be connected, drainage would be ensured, whilst the labourer would have less trouble in working thus than in opening pit after pit. In other words, I determined to make trenches. Now I had been practising an expeditious method of pitting, recommended to my steward by Mr. Gough, forester to Lord Downe, and which consisted in merely hacking the pits over to about fifteen inches in depth instead of digging them out. It proved, nevertheless, quite as efficacious as the former, in both heavy and light soils, and was accomplished at one-half the cost. I resolved, therefore, that this should be the base of my proceedings, and directed that the trenches should be merely hacked and not dug out. One man stretched a line, and took off a light sod, and another followed, hacking the soil in as far as he could go. I was away when the method was first put into operation, but my steward wrote at once to say, "it is the handiest method we have tried yet, and the men are getting on much faster." Indeed, I was quite surprised at the speed with which the remaining preparations for planting were got through. On grass land the trenches had a peculiarly neat appearance, as opposed to pits. Where the soil was stiff and heavy, I directed the trenches to be made up and down, so as to allow the water to drain off. This was attended with the most felicitous results. On dry hill-sides, on the contrary, I directed them to be made horizontally, so as to catch all the water that might descend. This, too, proved a great success. On knolls and rounded hills I followed the contours of the eminences, and went round them at about the same level, so that an irregular tract thus prepared looked in the distance like an ordnance map in relief.

All the plants that have been placed in these narrow trenches, as the men call them, have succeeded excellently; and, indeed, it stands to reason, for the roots have ample room to spread themselves in, and they can be better cleaned of weeds. In exposed situations the plants can also be placed closer together, so as to give a nearer approach to the nursery lines. I put in small plants, as the trenches are made only the width of a spade.

The distance of the trenches from each other will be a matter of circumstance and situation. In grass land, I shall in future make the space wide enough to admit of a scythe between the rows, and a meadow can thus be maintained for a short time, while the trees are growing to proper size. I shall also in future make more use of curved lines in raising them, as the cost is but slightly greater, whilst the hideous formality which accompanies young plantations will be in some measure obviated. Where the trenches have been run in semicircles the effect is particularly good, and the first semicircle having been made, there has been no subsequent difficulty in keeping the distance.

The sods can be either turned on their backs, when, if rammed into the trenches, they will form an efficient means of steadying the plants against winds, or they may be removed for other purposes.

I had not intended making public this method until after I had gone through the question of cost, and made experiments in various soils as to the comparative cost of this and the old methods. These experiments are not yet completed. An account, however, has been kept from time to time of what has been done, and I find that in most soils the average work of two men, working by the day and not by contract, has been from 150 to 220 yards per diem. On very light soil more might be done, whilst in the case of an old plantation, where many roots had to be grubbed up, and the turf was tough, the average has sunk to 80 yards. Where the lines are straight, and the soil not tenacious, I think 200 yards per diem should be reached. At whatever distance within reason the trenches may be put apart, this will give a cost per acre far inferior to that involved by the ordinary method of pitting. I think Mr. Brown, in his "Forester," gives 18s. per 100 as the contract price for pitting, but not having the book with me, I cannot refer to the size of the pits he intended making, nor have I figures of my own experience with me to which I can turn. I have thought, however, that it would be more useful to publish the method now than to delay it for the sake of the figures, which can be put down at any time.

In all planting operations, where preparation of the ground has been deemed necessary, I have entirely adopted this method, to the almost total discontinuance of pitting. I shall be glad to hear if others have done the same, after reading the above, and as to how far they may be satisfied with the results. Meanwhile, I cannot help thinking that the plan is so simple that, once propounded, it must find acceptance, and prove the solution of a great many difficulties.

## SIKKIM RHODODENDRONS.

There are a number of these shrubs perfectly hardy. I advise all lovers of Rhododendrons to plant *R. Thompsoni*, as it is one of the finest of the Sikkim species, not only being hardy, but it blooms most profusely, grows freely, and a large plant in full bloom is not soon forgotten. In the grounds of Penllergare, Swansea, the seat of J. D. Llewelyn, Esq., several species of Sikkim rhododendrons succeed remarkably well. I consider *R. Thompsoni* the finest of all. There is a fine specimen at Penllergare which has not had the slightest protection during the last twenty-three years. I have also planted many layers of it in the woods, where it grows as freely as *R. ponticum*, and it is planted in different parts of the pleasure-grounds with equal success. I believe the Penllergare specimen of *R. Thompsoni* was the first that flowered in England. It produced flowers in 1858. Many Sikkim rhododendrons succeed better planted out of doors than when grown in the greenhouse. I saw a plant of *R. Fortunii* a month since in Messrs. Veitch and Sons' nursery, Coombe Wood, not injured in the slightest degree by the severe weather. I also saw a specimen of the same species planted out in a conservatory, and it was very unhealthy, not nearly so fresh and luxuriant as the one in the nursery at Coombe Wood; *R. barbatum*, *R. arboreum*, *R. Falconeri*, *R. Hodgsonii*, *R. glaucum*, *R. ciliatum*, and a few others also succeed better out of doors than under glass. Will any of your readers who have grown Sikkim rhododendrons out of doors state what species have succeeded best?—John Nunns *in Journal of Horticulture.*

Rapidity of Growth in Wellingtonia Gigantea.—I have known the growth of this Conifer to reach 40 in. in one year. To determine precisely the exact elongation, I tied the leader of a fine young seedling, planted in a favourable locality, to a measured stake, and by this means ascertained the growth by night to exceed that by day; but this depended upon the weather, varying from ½ in. during a warm, sultry night to 1-16th in., or an imperceptible growth, during a day of the brightest and hottest sunshine.—T. Reid, in *The Garden.*

# The Future of Epping Forest.

By WILLIAM PAUL, F.L.S., &c., Waltham Cross, Herts.

(*Continued from page* 861.)

Under the head of planting it would seem well to consider that the picnic or gipsy party is a favourite outing with the English people, and ample provision should be made for the customary spread in a forest devoted to their recreation and enjoyment. This I would propose to accomplish by planting a series of groves in suitable spots, keeping the stems of the trees clear of branches eight feet or more from the ground, thus combining opportunity for freedom of movement with perfect shade. Whateley tells us "a grove is a place wherein to tarry with secure delight, or saunter with perpetual amusement."

> "Thou dark grove,
> Thou hast been called the seat of melancholy,
> Thou art wronged; thou seem'st to me a place
> Of solace and content, a paradise,
> Thou givest more than ever court could do,
> Or, richest palace." —May.

Beech groves and oak groves might be formed from trees already existing and there might be added chestnut groves, birch groves, lime groves, cypress groves, cedar groves, Wellingtonia groves, and others almost without limit. These trees should be planted in masses and in such manner that they also vary and improve the character of the Forest scenery.

7. Trees.—I shall now offer a brief list of trees and shrubs which stand foremost, in my opinion, as likely to contribute most to the improvement of the existing landscape:—

(1.) Deciduous Trees, remarkable for the beauty of their unfolding leaves, in spring:—Purple Beech, *Fagus sylvatica fol. pur.* Purple Birch, *Betula alba fol. pur.* Purple Horse Chestnut, *Æsculus hippocastanum fol. pur.* Corstorphine Plane, *Acer pseudo-platanus luteum*, leaves yellow. Colchicum Maple, *Acer colchicum rubrum*, leaves red. Larch, *Larix europæa*, leaves light fresh green. *Pyrus aria*, in varieties, leaves white.

(2.) Deciduous Trees for summer leaves:—Birch, *Betula alba.* Plane, *Platanus occidentalis.* Poplar, of sorts, *Populus.* Lime, *Tilia europæa.* Horse Chestnut, *Æsculus hippocastanum.* Spanish Chestnut, *Castanea vesca.* *Gleditschia triacanthos.* Mountain Ash, *Pyrus aucuparia.* Turkey Oak, *Quercus cerris.* Magnolia, of sorts. Deciduous Cypress, *Taxodium distichum.* Acacia, *Robinia pseudo-acacia.* *Ailanthus glandulosus.* Sycamore, *Acer pseudo-platanus.*

(3.) Deciduous Trees, remarkable for the beauty of the decaying leaves in autumn:—Scarlet oak, *Quercus coccinea.* Liquidambar, *Liquidambar styraciflua;* leaves red, purple, and yellow. Norway Maple, *Acer platanoides*, leaves yellow. Scarlet Maple, *Acer rubrum*, leaves red. Tulip tree, *Liriodendron tulipiferum*, leaves yellow. *Parrotia persica*, finely coloured leaves. Stag's-horn Sumach, *Rhus typhina*, leaves red and yellow. Black Walnut, *Juglans nigra*, leaves yellow. *Kolreuteria paniculata*, leaves yellow. Ginko Tree, *Salisburia adiantifolia*, leaves yellow.

(4.) Evergreen trees, for shelter and effect in winter:—*Araucaria imbricata.* Deodar, *Abies Deodara*, on hills or slopes. Mount Atlas Cedar, *Cedrus atlantica.* Cedar of Lebanon, *Cedrus Libani.* Douglas Fir, *Abies Douglasii.* Spruce Fir, *Abies excelsa.* Austrian Pine, *Pinus austriaca.* Corsican Pine, *Pinus laricio.* Pyrenean Pine, *Pinus pyrenaica.* Scotch Pine, *Pinus sylvestris.* Lawson Cypress, *Cupressus Lawsoniana.* Lambert Cypress, *Cupressus Lambertiana.* *Wellingtonia gigantea.* Arbutus, *Arbutus Unedo.* Evergreen Oak, *Quercus ilex.* Holly, *Ilex aquifolium.* Black Spruce, *Abies nigra.* Piceas, *various.* Hemlock Spruce, *Abies canadensis.* *Pinus insignis*, less hardy than others, but desirable for its colour; should be planted on hills and slopes. *Pinus excelsa.* *Sequoia sempervirens.* *Cryptomeria Japonica.* *Thujopsis borealis.* *Thuja Lobbii.* Chinese Juniper, *Juniperus sinensis.* Red Cedar, *Juniperus virginiana.*

(5.) Flowering Trees:—Crab, *Pyrus malus*, and its varieties. Cherry, *Cerasus*, of various sorts. Hawthorn, *Cratægus oxyacantha*, and its varieties. Double sloe, *Prunus spinosa fl. pl.* Almond, *Amydalus communis.* Plum, *Prunus*, of various kinds.

It may be said that this is a rather limited list of trees, and I admit that it is so. But, then, it must be remembered that we are looking at the question from the *Forest scenery* rather than from the scientific or gardenesque point of view, and for the realization of our object we prefer to plant a few really *effective* trees on a large scale to the introduction of a multiplicity of non-effective species and varieties.

8. SHRUBS AND PLANTS.—Of Shrubs, of moderate and lowly growth, the Rhododendron, *R. ponticum*, should specially abound. There are many spots in which it would thrive as well as in its native habitats, and the richness of its foliage in winter and the gorgeousness of its blossoms in May and June commend it to every observer. Scenes of grandeur and beauty might be wrought out with this shrub in conjunction with existing trees that would strike every beholder, and appear and reappear with their cheering influence in the future amid the busy scenes of the office and of the workshop. The *Azalea pontica* is also a fine-flowering shrub; *Garrya elliptica* too, which is evergreen, producing catkins like the Hazel in winter, the *Leycesteria formosa*, and the *Mahonia aquifolium*, are all desirable shrubs. The Hazel, *Corylus avellana*, is also desirable on account of the catkins and nuts it produces, and the scarlet and golden Willows, *Salix*, and the red-barked Dogwood, *Cornus*, for the colours of their bark in winter. The Furze, *Ulex europæus*, should be sown largely in dry, stony places; the splendour of its golden blossoms in early summer

is well known, and its rich, strong scent is generally agreeable. The Broom, *Spartium scoparium*, is also a beautiful plant. However desirable it may be to preserve the species of British plants growing at present in the forest, it is probable that some will be unintentionally diminished in number or perhaps destroyed by the work of draining and other improvements. It might, however, be possible to have stations at which the rarer kinds, as the Sun-dews, *Drosera*, could be preserved, and the natural Flora might be largely increased by sowing seeds of others broadcast over large tracts of prepared ground in spring. Primroses and blue-bells exist already in great abundance, and there are perhaps no prettier wild flowers than these in spring; but there are many others of rare interest which are absent or are met with only occasionally. Such might be introduced or increased in number at a small cost, and, under this head, odoriferous flowers should be largely cultivated. Thus the unavoidable diminution on the one hand might be compensated for by an increase on the other, and no wild flowers, however insignificant in appearance, should be heedlessly destroyed. I would here put in a special word in favour of the Bramble, *Rubus fruticosus*; this should be encouraged on all sides, for this plant is beautiful when in flower, and attractive when in fruit. The Pampas grass, *Gynerium argenteum*, should prove a suitable and effective plant, and wild roses, wild honeysuckles, wild clematis, the hop, ivy, Virginian creeper, St. John's wort, lily of the valley, periwinkles, and violets, should specially abound. Heath and fern are already plentiful, and both are valuable, the former for its beautiful flowers, the latter for its leaves and autumn tint.

9. ANIMALS AND BIRDS.—We have hitherto been dealing with inanimate Nature, the still scenes of pastoral beauty. But we must not stop here. We want the variety and excitement of life and motion. In addition to the cattle which will presumably continue to pasture here, deer and other harmless *feræ naturæ* should abound in a forest of this size, and should be increased, or even imported, while noxious reptiles like the adder should, if possible, be extirpated. I am tempted to put in a word in favour of the Squirrel, although having in view foresters and keepers, I do so with fear and trembling. But there is certainly recreation and enjoyment in watching the gambols of a company of squirrels, and no one would begrudge them the nuts and acorns on which they principally feed. Unfortunately, however, they have the reputation of feeding on birds' eggs, and even killing young birds. And, again, they have the mischievous habit of biting the growing shoots off trees, which, by arresting growth, causes the tree to assume a stunted and miserable appearance. Nevertheless, I think, on summing up the pros. and cons. they should not be altogether excluded. A home in the forest is their birthright, and I would not deprive them of it. Birds, again, should be encouraged, by strictly preserving those that are indigenous to the Forest, and bringing others from various parts of England, keeping up a stock of the plants on which they feed by planting or sowing fresh seeds in spring.

It will hardly be questioned that a herd of deer crossing one's path in a forest ramble is a pleasant rencontre, while the flitting and song of birds is a constant source of interest and delight.

(*B.*) RECREATION GROUNDS (enclosed).—It may seem an anomaly to speak of enclosed recreation grounds in an unenclosed forest, but I presume that special recreation grounds must exist, and, if so, that they must be enclosed for the convenience and comfort of the public. Whether the fences be of iron or in true forestal character seems to matter but little, although I rather incline to the latter. They may be sunk or hidden by plantations. There should be open spaces for cricket and other English games. There should also be water of uniform and safe depth here for bathing, boating, fishing, and skating. In these grounds there could be a fair opportunity, should it be deemed expedient, for more elaborate ornamentation, by the introduction of various trees and shrubs which might not be in correct taste in the open Forest, as I have foreshadowed it, or which could not safely be trusted there. But I would not go further in this direction than the planting of trees and shrubs; I do not want a flower garden even here; the ornamentation, if more elaborate, should be but slightly so. Although I have offered the opinion that the open Forest should not be converted into an arboretum or a series of arboretums, I yet think that an ARBORETUM in the enclosed grounds would be a source of recreation and enjoyment to the public. It has, too, a *raison d'être* on scientific and utilitarian grounds. If somewhat formal within, the exterior might be so planted as to blend harmoniously with the natural scenery of the outside forest.

(*C.*) LODGES.—It would be too much to expect that every entrance to the Forest should be adorned with a Lodge or Lodges, but some, at least, of the entrances would seem to be proper and convenient places for them. A forest of between five and six thousand acres will of necessity require a staff of men—call them keepers or what you will—to perform the multifarious duties attendant on its preservation, and to maintain order. For comfort and economy their dwellings should be near their work, and this would in many cases require them to be *in* the Forest. These lodges and their surroundings should, I think, vary in design, that the one may not be mistaken for the other, but the whole might be of one style of architecture, and I should give the preference to the Gothic. In their construction ostentation or parade should be scrupulously avoided.

In conclusion, permit me to remark that while dwelling on this subject, I have been deeply impressed with the fact that never before in the history of England has such an opportunity been afforded of making a grand national recreation ground. Ostensibly for the use of the inhabitants of London, it may become in the future, and that without any vast expenditure of money, "a thing of beauty," which shall be a joy to every Englishman, and one of the bright spots of our island which shall be sought out by visitors from the most distant shores.

[*Correspondents sending letters signed with initials or fictitious names are requested to enclose their name and address, as otherwise their communications cannot be inserted.*]

## PERMANENT PASTURE.

SIR,—That my remarks upon the superior value of old pastures were not intended to apply to such exceptional cases as those adduced by Mr. Slater in the last number of the *Journal of Forestry*, may be inferred from a reference to a former article in Vol. II., p. 11, where I state that "The improvement of a pasture is to a great extent dependent upon the method of grazing—a fattening stock improving the quality of it, while a young and growing stock and dairy cattle rob it largely of its bone-earths."

I am quite aware that every milch cow, yielding upon an average only two gallons of milk per day throughout the year, robs the land of about 33 lbs. of dry bone, equal to 40 lbs. of common bone-dust, in that period. The coming calf also requires nourishment, and in this way another ten pounds may be appropriated in the course of the year, making 50 lbs. in all. Recent experiments give much higher figures. Thus an acre of land may lose a ton of its bone constituents in less than 45 years, provided none of these be restored in the shape of top-dressings. In a similar manner the wool shorn from our flocks robs the pastures of their sulphur, as wool in a dry and clean state contains five per cent. of this substance. And thus it happens that upon hill pastures, to which no dressing is applied, the more valuable grasses die out, the result being a smaller yield both of wool and mutton. But a timely application of gypsum helps to maintain the equilibrium, and even superphosphate and lime itself assist greatly.

In these days of keen competition and early maturity, and at a time when dairy produce is so highly remunerative, I know of but few cases in which even milch cows have to subsist entirely upon what they crop from the meadows in which they are depastured. With us, they are daily fed in the stalls, with linseed and cotton cake, malt dust, grains, pollard, comfrey, roots, or whatever happens to be available, and afterwards turned into the pasture to supplement this feeding with the fresh herbage. As the manurial values of these feeding stuffs range from one-half to three-fourths of their prime cost, the land must necessarily benefit greatly by the droppings from animals so kept.

I can hardly conceive a case in which from long neglect the droppings from the cattle are allowed to accumulate in one place and for so long a time as entirely to destroy the herbage or render it worthless! Careful management will ensure the collection and redistribution of these over the remoter and poorer parts of the meadows. And upon most well-managed farms the fertility of the pastures is kept up by feeding upon them either root-crops, cake, or corn, or by such top-dressings as shall repair the exhaustion caused by the production of milk, bone, and wool.

My remark that pastures (under proper management) become year by year richer in vegetable matters, was put forward only as a corollary to the proposition that plants derive their principal supply of carbon from the atmosphere, and Mr. Slater's statement in no way invalidates the truth of this. Where grass lands are occasionally mown as well as grazed, the land is enriched by the additional root-growth which remains in the soil. This is mainly due to the vigorous action of the stomata of the full-grown plant, and their increased powers of absorbing carbonic acid gas from the atmosphere. It is owing to this that the produce of roots left in the soil from a clover crop which has been allowed to grow up and be mown twice during the summer, is much greater than that from a crop which has been once mown and afterwards grazed, and still greater than the produce from a crop which has been entirely fed off. The learned author of the best work upon grasses extant—"Hortus Gramineus Woburnensis,"—estimates that a crop of grass, cut when properly ripe, leaves in the soil an additional root-growth equal to one-fourth the weight of the crop.

Mr. Slater's remarks upon exhaustion are more especially applicable to the lighter siliceous soils, and instances of such and of a restoration to fertility by liberal boning, are not wanting in Yorkshire; and upon Lord Combermere's estate in Cheshire a heavy boning has been known to treble the value of the land. But upon the deep, rich clays of Hereford and Monmouth and some other counties, the pastures undoubtedly become more valuable year by year, even under ordinary treatment. An extract from a recognised authority on this subject will be more convincing than any statement of mine. Professor Johnston says: "Some grass lands will retain the good condition they thus slowly acquire for a very long period, and without manuring, in the same way and upon nearly the same principle that some rich corn lands have yielded successive crops for 100 years without manure. The rich grass lands of England, and especially of Ireland, many of which have been in pasture from time immemorial without receiving any known return for all they have yielded, are illustrations of this fact."

*Pluckley, Kent.* A. J. BURROWS.

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## THE VALUE OF THE SCOTCH FIR AS A TIMBER TREE.

SIR,—The Editorial Notes in your excellent Journal frequently invite practical information to guide intending planters who are in doubt about planting poor lands unfit for other cultivation.

The good character long held by the Scotch fir as the best tree for such soils has been recently called in question by Mr. Michie (well known as a frequent writer on arboriculture), who is doing his best to destroy its hitherto unquestioned reputation. In the *Gardeners' Chronicle* of 17th ult., he writes as follows in reference to planting light moorlands unfit for other crops: "Such land is very commonly planted with larch and Scotch fir, and a mixture of Norway spruce; now it is very discouraging to state that any and all of these species of conifers are quite unsuitable for planting this description of ground." He then gives an instance of a plantation on the Marquis of Lothian's estate in Roxburghshire, which proved a great failure: "the Scotch fir trees dying when about twenty to twenty-five years old without giving any premonition, one year looking healthy, and the next year dead and withered," and this unfavourable example Mr. Michie considers sufficient to justify him in declaring the Scotch fir to be quite unsuitable, and, strange to say, in recommending instead silver fir, larch, and beech as substitutes.

Without doubting in the least the honesty of Mr. Michie's convictions, I think it will be found that in his numerous writings on Forestry, he too often draws rash conclusions from the results of his own operations, and is too ready to discredit the opinions of other practical men when their experience happens to differ from his own. In the present instance I think we may safely conclude that if Scotch fir fails in any case to grow on the soils Mr. Michie describes, silver fir, larch, and beech will meet with the same fate, and from the same cause. If, however, we look for guidance to the many practical foresters whose opinions may be easily gathered from the pages of Loudon, and other acknowledged authorities, we shall find that they all with one accord give the highest place to the Scotch fir, and show many excellent reasons why it is more likely than any other tree to grow on nearly every description of soil.

I would, therefore, recommend intending planters to pause before following Mr. Michie's advice, and if they read the following quotations, they will at any rate see that his singular dislike to our native pine is not supported by others whose opinions are of greater value than his own.

In Loudon's "Arboretum Britannicum," Vol. IV., will be found as follows:—"As a timber tree for planting on poor, dry soils and in exposed situations, none can excel the Scotch pine;" again, "the Scotch fir will grow and flourish in any kind of soil from a sand to a clay, provided the substratum be rubble or rock;" again, "though the Scotch pine has a superior adaptation to dry, sharp, rocky soils, yet there are many situations of poor, wet till and clay, and even of peat moss ground where it would be advantageous to plant it;" again, "the Scotch pine may be planted in the thinnest and driest soils, and even in mossy soils when less than two feet deep on an open bottom;" and again, "the natural location of Scotch fir in poor sandy soils does not result from these soils being best adapted for it, but from its growing more vigorously in them than any other tree."

These are a few out of many similar notices to be found in Loudon and other well-known writers, and the pages of the *Journal of Forestry*, and other periodicals, will furnish ample evidence of the same kind.

The accumulated experience of more than a century is distinctly in favour of planting Scotch fir on poor land, in preference to any other tree, and the reason is not far to seek, when we consider the certainty of getting a more or less useful and valuable crop of trees, the comparatively smaller outlay at first for the young plants, its usefulness for many purposes at different periods of its growth, and its power to withstand the severities of the coldest and most exposed situations.

A frequent cause of the failure of the Scotch fir is a wet moss lying on a hard, impervious moorland pan, which is sure to stop the progress of the trees, and cause them to die off as they did on the Marquis of Lothian's plantation described by Mr. Michie, but it is worse than useless to plant land of this nature with trees of any sort, and to break up and ameliorate an obdurate pan by drainage and other necessary operations is a difficult and costly process.

The Silver fir is a noble tree when in full health on a congenial soil, and although it luxuriates in deep, loamy soil, it will accommodate itself to poorer quarters if not too much exposed. It would be rash indeed to plant it on poor, open moorlands without shelter, as it is well known to be very tender in its youth, being always injured more or less by spring frosts, which greatly retard its growth until it is about ten years old. Mr. Grigor, in his work on "Arboriculture," describes it as being "altogether unfit for the bare and rough elevations adapted to the Scotch fir and larch.

Yours faithfully,
WILLIAM BAXTER SMITH.

*Broadlands, South Norwood,*
*20th April*, 1880.

## INJURIOUS INSECTS.

SIR,—In your April number you are kind enough to draw attention favourably to the work on which my colleagues and myself are engaged, of endeavouring to collect and publish sound information as to remedies that are found really serviceable in checking insect ravages. With your permission I should be glad to ask your assistance towards a further extension of the work. There appears to be a great want of some volume in which cultivators and all interested in the subject may turn at once to a short and clear account of the common methods of insect injury to our timber and food crops, together with information as to remedies that have been found of use, and an account of the insects in language intelligible to general readers. Circumstances have put it in my power to endeavour to compile such a "manual," and the enclosed Circular gives a general sketch of the plan proposed for the work.

In this handbook one great object in view is to give accounts of treatment found to prove useful, as practical remedies (answering the purpose, and worth using) on different kinds of soils, and in the different kinds of weather of successive years in our climate.

The last few years have so much increased the amount of attention bestowed on these subjects, that probably if those who are well informed as to the best treatment for the protection of the special crop or kind of timber which comes under their most immediate direction would be good enough to contribute that one piece of information, the gain to the country at large by this being given would be literally incalculable.

All points bearing on the subject would of course be welcome additions, and of these I note the most important in the Circular.

With regard to the insects, through kind co-operation (and such additional figures as I can supplement any special needs with) I believe it will be in my power to give excellent and almost complete illustrations of the species mentioned, and as at present there is much difficulty from the descriptions being usually given partly in scientific terms, I propose (as an English writer to English readers) to give them entirely in English words. Most of our leading writers, whether English or foreign, use some of the common words of their own country, the selection varying according to the fancy of the writer; I therefore propose to take these words, such as thighs, shanks, feet, claws, wing-cases, &c., instead of Femora, Tibiæ, Tarsi, Ungues, Elytra, &c., which I believe will be equally correct, and certainly much easier understood by general readers. When we come to matters of such minute distinction, so that the point cannot be conveyed without technical terms, it is much the best way to forward the specimen for examination; for general purposes the common pests are only too well known.

In endeavouring to compile this handbook, my object is to be the means of placing the information in such a form and at such a price as may put it within the reach of all, and especially of young working foresters, gardeners, and farmers. From circumstances unnecessary to mention, it would be amply sufficient for myself to cover publication expenses, and I therefore hope to offer it at a less price than that named in the Circular as the one not intended to be exceeded.

I am fully aware of the favour granted me in receiving contributions of such valuable information as those I venture to ask; nevertheless the gift of them from the writers would be one of such great worth to the country that I trust I may ask their aid, and on my own part no exertion would be spared in utilizing what may be entrusted to my charge. For your own valuable assistance in approving my plan, and giving mention of it in your influential Journal, I can only express my most sincere thanks.

ELEANOR A. ORMEROD.

*Dunster Lodge, near Isleworth,*
*April 9th,* 1880.

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## "CATCH-CROPS."

SIR,—Your pages being devoted to the advancement of the science of Forestry, and the elucidation of the best systems of Estate Management, I can hardly understand the purpose of "Rusticulus" detailing his failures at what he calls "Catch-crops;" it may have certainly a sort of negative value by warning novices at farming not to do likewise.

As "Rusticulus" has candidly admitted his failure with one of the most elementary courses of cropping, I fear he has to write "failure" on his terrier too often. Notwithstanding his extensive reading, the warning of Professor Wrightson, and twenty years' experience to boot, I will point out for his future guidance why he failed; and perhaps the result of my thirty years' experience may lead him to admit that he stands in the position of the aspirant for histrionic fame he refers to in his letter, and that he has something to learn before proffering advice either to the inexperienced in farming, or those whose experience and mature judgment warrant them in giving a record of facts for the guidance of others.

In the first instance, swedes after mown rye, with the land well worked, is *not* a "Catch-crop." The blunder was in the way of doing it. Heavy land should not have been steam-ploughed in May, especially as the ground was matted with the roots of the rye. In ordinary farming, the rye stubble would have been ploughed in immediately after the scythe, but not with a steam plough (he omits all mention of his vain attempt to get a tilth fit for swedes). The land should have been worked on ridges, and then "back-bouted," and there would have been ample time to cross it with "drag-harrows," and to drill with "kohl-rabi," or white turnips, if the weather prevented swedes being got in in time.

How the confession of failure by "Rusticulus" can invalidate the simple record of success I cannot see, yet he says it is utterly fallacious to speak of the yield of 11 acres from 5½ acres. If by judicious planting for an extra crop on the same ground, it produces a yield, it is correct to call it an extra crop.

The particular instance of 5½ acres of cabbage interlined between the rows of potatoes was taken as it was found in a terrier of crops on a mixed farm of 800 acres, and dated for seven years consecutively from 1862 to 1868. I might have gone back to my recollection of success at interlining crops thirty years ago, but as the section of my subject was not crops, but "Estate Book-Keeping," of which I offered the best examples of the systems I have known instituted, I should like your readers to be favoured with the experience of "Rusticulus" on this topic.

J. Charles King.

## TRAINING OF YOUNG FORESTERS.

Sir,—Nearly two years ago, in answer to a letter of mine under the above heading, readers of the *Journal* were informed that the Scotch Arboricultural Society had this matter in hand, and great things were expected. At the Society's last meeting the Committee appointed at a former meeting to consider the subject was asked to report progress, but had to make the disappointing statement that nothing had been done in the matter. A new Committee was formed, and since then we have heard nothing further about the "Training of Young Foresters," but I have hopes the present Committee will be able to make a good report at the next Annual General Meeting of the Society. As many young men are deeply interested in this matter, and as the *Journal* is *our* real "organ," would it be too much to expect through your paper a hint, however little, of any meeting of said Committee? We would then know that the machinery was in motion and making some effort for the credit of the Society and the benefit of its members.

D. SYM SCOTT.

*Ballinacourte.*

## DEATH OF ROBERT FORTUNE.

WE have to announce, with deep regret, the death on the 13th April of the distinguished Eastern traveller and plant collector, Robert Fortune. He was born on the 16th September, 1812, in the parish of Edrom, Berwickshire. After receiving a good education at the school in his native parish, he served an apprenticeship in the gardens at Kelloe House, in the same neighbourhood. He then proceeded to Moredum, near Edinburgh, as a journeyman gardener, and from thence he entered the Botanic Gardens of Edinburgh, then under the charge of the elder McNab. From here he went to London in 1842, where he received the appointment of Superintendent of the hothouse department in the gardens of the Royal Horticultural Society at Chiswick, then in the hey-day of their greatest eminence. In 1843 the Society determined to send a plant collector to China, and selected Robert Fortune for the important post. How well he fulfilled his mission is well-known to every admirer of plants, by the great number of highly ornamental as well as useful species which he has been the means of introducing to this country during that and successive journeys to the East. In 1848 he returned to China, being commissioned by the East India Company to introduce the Tea plant from China to India, which he successfully accomplished in 1851. He again visited China in 1852, and in 1858 he travelled through Northern China and Japan. In the course of these journeys, extending to from two to four years, he discovered many new plants, which he sent home generally with the greatest success, considering the long distance and the numerous accidents to which such delicate subjects are liable in the course of a long sea voyage.

Many of these introductions are now to be seen in prominent positions in every collection of plants in the country, and will long be looked on as living memorials of the steady perseverance and indefatigable energy of Robert Fortune. From stately tree to lowly herb they all attest the distinguished ability, good taste, and industry of the famous collector.

# THE HOME FARM.

## OPERATIONS FOR MAY.

AFTER the favourable spring we have experienced, all farm work should be well in advance; barley sowing should be at an end, potatoes and carrots planted, and both clover and grass seeds sown.

The brushing or dragging and rolling of meadow land may still be continued, especially where sheep have been thickly kept and fed with corn, cake, roots, &c. Young seeds may yet benefit by an additional rolling, and two or three cwt. of gypsum per acre applied when it will adhere to the leaf.

The principal work of the month upon arable farms will be the preparation of the land and the planting of tares, rape, roots, kale and cabbage for summer, autumn, and winter feeding. A thorough cultivation should have been given to such land after the last harvest, and manure applied to the heavier soils during winter. It will now require a thorough scarifying and cleaning, and the application of such artificial manures as may be suitable to the crops. All crops intended to be carried off the land should receive a liberal supply of well-rotted farmyard manure. This is especially necessary with potatoes, carrots, beet, and mangolds. Where the crops are to be fed off, artificial manures alone will suffice.

*Tares*, or vetches, may be put in successively throughout the month. The winter variety is preferable for soiling, as it yields a more abundant cutting.

*Mangolds* for a principal crop should have been drilled in April. Where the work has still to be done, make use of a liberal supply of seed, as much of the yield of 1879 is inferior in quality. Thoroughly scarify and pulverize the land, and work in from three to five cwt. of common salt, according as the soil is heavy and cold or light and warm. If dunged already, use from four to five cwt. of genuine bone superphosphate, sown upon the surface and baulked in. Heavy crops may be grown in rows from eighteen to twenty-four inches apart, according to the strength of the land. Sutton's Mammoth Long Red is a heavy cropper, and their Golden Tankard yellow-fleshed variety is valuable for dairy purposes.

*Swedes* may be put in towards the north by the middle of the month, and in the south and eastern parts of England before the end.

It is especially necessary to secure new seed, and to place the artificial manures where they will act immediately, so as to push the young plant rapidly into the rough leaf, after which it is considered safe from attack. In using the water drill, or the manure distributor, it is important to prevent the seeds coming in immediate contact with nitrate of soda, guano, &c., as these destroy their vitality.

*White Turnips,* such as the Tankard and the Purple-topped Mammoth, may now be sown for feeding off in August and September. But the main turnip crop will be considered next month.

*Thousand-head Kale and Cabbage* for winter use may be drilled during the present month, but for the autumn crops the plants should now be taken from early seed-beds. Allow for singling out at distances of two by two feet at the least, and more for Drumheads and the larger growths. No green crop stands the winter better than the kale, and in early spring it supplies a delicious green for the table, and abundant sheep and cattle food.

*Hops* which have been poled in April will now require shimming or nidgeting to loosen the ground and keep down weeds. Before the poles are furnished let all rank and hollow-grown bines be drawn from the hills by experienced hands. If tied to the poles these only disappoint the hop-grower. Dress weak hills with a little nitrate of soda or kainit, and dig in soot, rapedust, maltdust, or other stimulating manure, where a general slackness of bine is observed. Where hops are apt to mould, prepare for an early use of the sulphurator.

*Horse-hoe* wheat, peas, beans, oats, and all crops which have not been sown down with seeds, and use the brake liberally amongst potatoes and early-sown mangolds. Also hand-hoe all crops which require this, and thus by stimulating early growth in the corn smother the weeds.

*Farm Stock.*—Lessen the work of brood mares, and either supply them with a little green food in the stalls, or turn them into open yards or meadows for a few hours in the day. Dairy cattle should be liberally supplied with mangolds and cake until they are turned into the pastures. Young stock may be turned out to grass before the middle of the month. Prickly comfrey and rye, where such are grown, will supply abundant cuttings throughout the month. Both will be found useful among the dairy cows and in the stables. To force lambs and tegs, &c., give a liberal allowance of cake upon young seeds. In very wet weather remove them from white clovers or give a little cotton-cake. Put sheep on early tares or rye, and plough close to the folds.

*Mowing.*—In early districts *Trifolium incarnatum* and Italian rye-grass will be fit for cutting by the end of the month. These should not be allowed to get overripe.

*Estate Work.*—As the bark-stripping proceeds horses will be required to remove the timber and faggots, and deliver the bark when properly harvested. Cordwood must also be carted, and stable manure taken to the gardens. Where game is preserved some buckwheat should also be sown in drills at distances of about a foot apart. It is a very attractive food for partridges. Being rapid in its growth it can be sown late, thus affording great facilities for cleaning the land. It will grow without manure and upon the poorest soils. A bushel of seed is sufficient for an acre of land. The produce is often forty bushels to the acre. Clean hedges and fill up holly fences. Orchard trees planted out early in the spring may also require watering.

*Poultry* will require great attention. Give young chickens a good run, with access to green food. Keep young turkeys dry, and feed well on a mess of boiled potatoes and young nettles chopped fine, with a little cayenne. To keep poultry in a healthy state give dry food twice in the day and wet food between. Also mix a little brimstone with the latter at least once a week. B.

## TREE PLANTING IN PUBLIC THOROUGHFARES.

The Manchester papers contain descriptions of a very pretty and interesting ceremonial which took place recently in the suburbs of Salford. The scene was a leading thoroughfare, the actors forty-eight ladies, and the decorations young trees. The idea lately occurred to Mr. Councillor Armitage, of that thriving borough, that the roads of a not very picturesque neighbourhood might be made more attractive by a bordering of trees. "They have them in Paris," he said, "and why not in Pendleton?" Accordingly, he resolved upon an experiment in arboriculture, and the Highways Committee having given him full powers to have as many trees planted as he liked at his own expense—the ratepayers were to pay nothing—Mr. Armitage proceeded to carry out his idea. He procured from a nursery at Stoke-upon-Trent four dozen "silver beeches," specially grown for avenues, and prevailed upon as many Pendleton ladies to grace the occasion of the planting by performing the ceremony themselves. This was what came off on Saturday in presence of a large assemblage, when a little speech was made by the public-spirited donor of the trees, and letters of apology and regret were read, winding up with the inevitable post-card from Mr. Gladstone. The first tree was planted by the Mayoress, the second by a lady who had seen nearly ninety summers, and presumably about as many winters, and the remainder by a brilliant array of graceful matrons and maidens, whose names are all duly recorded in the local journals. This example cannot find too many imitators, for if the suburbs of smoky Manchester allow trees to grow in health what might not be done in towns more highly favoured both as to climate and soil?

## ENGLAND.

Copious April showers after an unusually dry winter have given a good start to most of the transplanted deciduous trees; but many of the evergreens—and more especially those removed during the short period of open weather in the early part of March—have suffered severely.

Bark-stripping has also been going on since the 19th inst., and in most places the trees strip easily. With warm nights the work will now proceed uninterruptedly, and it will soon be brought to a close, as the fall is in most places a small one. Every attention should be paid to the stacking, so as to secure the bark from the effects of heavy rains. If this is properly done very little turning or moving about is required even in the wettest season.

Nursery transplanting may still be proceeded with in favourable weather, especially with seedling pines and conifers generally. Large evergreens may also be transplanted either by puddling the roots or raising them with a good ball of earth.

Coniferous seeds should be sown at once, and the surface of early-sown beds should be loosened by means of a light roller. Keep a good look-out for birds, and uncover and water all seed-beds when necessary. Early weeding is especially necessary in seed-beds of all kinds, for as soon as the weeds gain strength their removal interferes materially with the young plants.

Large evergreens, or indeed trees of any kind which are ultimately intended to stand singly, and in conspicuous places, should have ample room given them in the nursery previous to their final transplanting, to enable them to develop good and well-balanced heads, and also to harden them.

Trees planted out during the early dry season will now require a careful examination and well treading or ramming up. Where the heads are good, and judgment is used in planting the trees, but little staking and tying will be necessary.

Digging in young plantations may still be carried on with advantage if the surface of the land be not left in too rough a state.

Wood hedges will require immediate attention before stock is turned into the adjoining meadows. All gaps in hedgerows caused by the felling of trees should be at once filled up. Keep cattle from browsing upon the oak buds, which often prove highly injurious to them.

As fast as the thinnings of oak are felled and stripped in a mixed coppice, both timber and faggots should be cleared from off the young shoots, and if the bark is stacked outside, all roads leading into the falls may be stopped at once. This will prove of great advantage to the future crop of underwood.

Wherever land has been cleared of a crop of timber a thorough cultivation and cleaning should precede a second planting. A vegetable crop manured is probably the best preparation for replanting; but in all cases dead wood, decaying roots, &c., should be carefully removed or burnt. Many of the diseases with which young antations are visited are the result of a disregard of this rule.

Grass seeds may still be sown upon woodrides or for cover in the more open parts of the woodlands. But the roller should now follow the sower or the seed-barrow. Wood millet, wood meadow grass, rough-stalked meadow, and giant birdsfoot trefoil will be found very serviceable as cover for game.

Reclaiming land, fencing, road-making, draining and any other operations may proceed as time will admit, and all heavy cartage of materials should as much as possible be pushed forward during the early summer months.

Where hedges of whin or hawthorn have been either sown or planted they will probably now require some little attention—the former being carefully side-hoed, and the latter kept free from weeds of all kinds.

Collect all refuse materials for forming composts, and turn such as were made early. Lime should be used abundantly, especially where mud, ditch scourings, and similar raw materials are available.

*Pluckley, Kent.* A. J. Burrows.

## SCOTLAND.

Finish the sowing of all coniferous tree seeds as early this month as possible. The larch, if intended to stand for two years, should be sown thinly, so as to allow plenty of room for the young plants; 300 to the square yard should never be exceeded. Attend to hoeing and weeding the nursery when the weather is fine.

Barking operations should be in full swing by the end of this month. The larch is now in leaf, and the buds of the oak are beginning to expand also. Labour is generally cheap just now, and if larch is to be carted any considerable distance, it will pay to bark it for the saving of carriage alone.

Look over newly-planted ground, and firm any of the trees which are swung with the wind. A great many shrubs have been damaged by the intense frost of last winter; where they are showing signs of weakness have them cut over near the ground, so that they may start away with a new shoot.

The present is a good time to thin neglected plantations. They will have made a growth before the ensuing winter which will help the remaining trees against the adverse weather which we generally have then. In dealing with plantations of this kind, the work should be done very cautiously, as a severe thinning might retard the future progress of the wood for many years.

W. W. R.

## IRELAND.

The beginning of the month is the time cattle are turned out to pasture, which makes it imperative that all fences be speedily, if not already put into a thorough state of security. Dig and clean young thorn hedges; it promotes a luxuriant growth, and keeps a close, thick fence at the surface of the ground, just where closeness is most essential.

The great work of the month is the stripping of bark. Seldom has it happened that this work could have been begun so early as this year. From the middle of April the bark came off freely, and no time should be lost in having the work well advanced; take the utmost care of the bark that it does not get discoloured on the drying stand, or it will reduce its value very much. Have it put into a rick when sufficiently saved, and always embrace the very first opportunity of doing so.

Keep the hoe going in the nursery as weeds begin to grow. One important point to observe is, never allow a weed to get into flower, or it will seed the ground all round. Clean walks and roll the gravel, which gives the ground a tidy effect.

Begin, if the weather is fine, to paint out-door work, such as gates, doors, and fences. It is advisable to do so this month, because if delayed till later in the summer, the weather being usually warmer, the paint dries too quickly, or runs on the work too thin.

Turn over compost heaps, if intended for use this season. Keep them well and neatly made up, and above all never allow a weed to be seen growing on them. Properly prepared compost is invaluable in the nursery garden or farm.

*Ballinacourte, Tipperary.* D. Sym Scott.

## WALES.

The present month is what may be termed the harvest time of the forester, as his principal occupation and greatest anxiety will be in the stripping and harvesting of the oak bark. If possible, the whole available strength should be centred in the operation, so as to have as much as possible removed from the trees during the early part of the season. The bark should be put thinly on the ranges every night, or oftener, as may be found necessary, according to the weather, always being careful to keep the outer side of the bark upwards. As soon as a sufficient quantity has been got thoroughly dry, and ready for the tan-yard, it should either be delivered, or put into a stack or shed, as circumstances require.

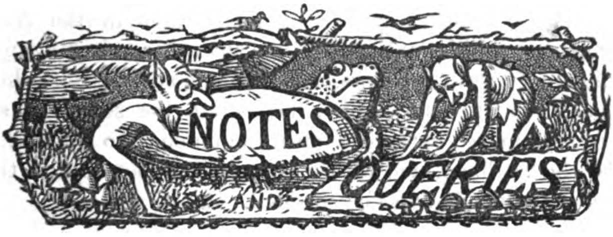
Look round recently-formed plantations, and see that the plants have not been swayed with the wind; if such is found to be the case, have them put upright, and secured with a stamp of the foot, adding a little soil where necessary. Keep all fences in good repair, and look round tree-guards and rabbit-proof netting, as there are now many young rabbits about, and they can get through a very small hole.

The nursery will now require attention in the way of digging and hoeing between the trees, &c.

*Kinmel Park.* LEWIS BAYNE.

**HORNBEAM.**—The Hornbeam is raised to the amount of from 5,000 to 6,000 plants a year, in Messrs. Perkins and Sons' Nurseries, at Northampton. It is raised from seed obtained in Scotland; the seed being sown when ripe, or kept in dry sand till the following spring and sown in the usual manner. According to Miller, the Hornbeam reaches 70 feet in height, with a large round stem, perfectly straight and sound, when growing on a stiff clay, which appears to be its natural soil. In this country it is much used for hedgerows, to afford protection and shelter in nurseries, &c., where it is kept cut back and clipped close. It is said to thrive on cold, barren and exposed hills, and in situations where few other trees will vegetate. It is by no means of slow growth, and resists the violence of winds better than most other trees, from its close, compact habit, and is thus well adapted as a means of shelter. It has been recommended that it "be raised from seeds planted in the spot where it is intended to grow, and these seeds may be sown in autumn, when they will germinate the following spring." In like manner with the Beech, the leaves of the Hornbeam remain on the branches till the young buds push them off in spring; it is thus a good winter as well as an effective summer shelter. The Hornbeam when in bloom is particularly elegant.—R. D., in *Gardeners' Chronicle.*

**ERRATUM.**—In the article, "The deterioration of Scotch Fir," which appeared in the March Journal, there are two errors which we desire to correct. On page 766, 17 lines down, for Mr. Don read Dr. Brown, and on page 770, in the table of analysis of the wood of Scotch fir, the quantity of limes in the first column should be 31 instead of 81.



[*The Editor desires to call attention to the utility of this department of the Journal, and hopes that young Foresters and others will profit by it to a larger extent than hitherto.*]

## QUESTIONS.

48. Coprolites.—What is the best course to adopt to ascertain if Coprolites are likely to be discovered on marsh or in low-lying valleys, and the simplest chemical tests ?—Saurian.

49. Growing Rhododendrons in Hollow Stumps of Trees.—Will some of your numerous readers who have had practical experience in the growing of Rhododendrons for ornament in hollow stumps of decayed trees, be so kind as to give details about it, such as the height of the stumps above the surface of the ground, the size of cavity, and the best kind of loam to plant with? If the loam should be connected with the soil underneath, if the plants can subsist permanently, and which variety succeeds best ?—Quæsitor.

50. Detecting Bad Seeds of Forest Trees.—Would some of your readers inform me if there is any recognised method whereby bad seeds can be detected ?—Say forest tree seeds.—G. M.

51. Illustrated Book on Forest Trees.—I should be obliged if you or some of your readers would tell me of any book having drawings of forest trees, clear and natural. I know there is "Loudon's Arboretum et Fruticetum Britannicum," in several volumes, but I should like to know of a less expensive work.—R. A. S.

52. Notching.—Please define Notching as applied to planting, this method being advocated by some of your contributors in preference to making holes or pits, I would be obliged if you would explain the process. An Indian Forest Officer.

[Notching is an expeditious method of planting, and is performed by the planter making two cuts (a, b,) with the planting spade, thus—$^{a}V^{b}$, and by slightly raising and pressing forward the soil. When the second cut (b) is made, the plant is inserted at the angle behind the spade, which being deftly withdrawn, the soil falls into its place, receives a firm stamp of the foot, and the operation is complete. A sharp, half-worn spade of the ordinary form suits well for "Notch" planting. Light-round-mouthed spades, specially made for the purpose, are also used; but the handiest implement of all for notching, in light, open soils, is the hand-iron, or small planting spade, commonly used in the North of Scotland for extensive hill-planting. The planter has a bag slung at his waist, in which he carries the plants, and with one smart stroke the hand-iron is driven by the right hand a few inches into the soil, in a slightly slanting direction, pressed forward to open the notch, into which the plant is dropped by the left hand, and with a stamp of the foot to firm the soil, the young tree is quickly and safely planted.—ED.]

## ANSWERS.

40. PLANTING LARCH AFTER LARCH.—A ten-year-old larch plantation has been burned down, and "Larix" wishes to know if the crop destroyed was old enough to exhaust the soil for immediate replanting with larch, which tree he prefers.—The first crop would not have materially injured the ground for immediately being refilled with larch; but, if the surface was of a peaty nature, and the burning took place during the summer, the fire would by burning dry the surface, and in such a case it will be preferable to wait a season or two before replanting with any kind of tree. If the ground is of a damp clayey nature which would not suffer from the fire, "Larix" need not hesitate replanting at once with larch.—D. S. S.

42. THE CULTIVATION OF GORSE.—Choose a piece of light sandy land. Thoroughly clean it, and work it into as fine a tilth as if it were intended for turnips. Procure about twenty-four pounds of French-grown seed for an imperial acre, and put this in with a corn-drill in rows from four to six inches apart. Some people sow with it about half the usual quantity of barley or oats. Any time from the end of March until the early part of May will do for the sowing. Roll down the land after sowing and pick off stones. Also keep the land quite free from weeds by repeated hoeings. At the end of about eighteen months—that is, the following October or November twelvemonth after sowing—the gorse will be fit for mowing, when it may be cut as required, carried home and passed through M'Kenzie's "Masticator," and afterwards cut up in an ordinary chaff-box. Or the gorse may be raised in a seed-bed and afterwards transplanted in the field not later than the early part of June. As soon as it is established it may be cut annually. Fabulous accounts of its productive powers, and valuable feeding and milk-producing properties, have been circulated from time to time by enthusiastic admirers. Its success in some parts of Ireland is undoubted, but its proper place seem to be upon poor sandy lands that will not pay the expense of cultivation. It is also found useful as game cover, and upon open commons, where cattle and even horses eat off the young shoots and thrive upon it. In some parts of Romney Marsh, where the surface of the land consists of little except fine beach, gorse has been planted, and its growth is now being rapidly extended by layering, a process which consists of little more than forcing down the branches and partially covering them with the sandy beach, when they soon take root. In this way a thin soil may be formed in

the course of years. As it is desirable to give it to cattle and horses in a fresh state, not more than two days' consumption should ever be cut at one time. The yield per acre has been variously estimated at from four to eleven tons, according to the quality of the soil and the cultivation.

RUSTICULUS.

To cultivate gorse prepare the ground as if for permanent pasture. Take a green crop off the ground, and as the crop is gathered, have the soil put up into drills. Let it remain all the winter in this state. In spring, harrow down the drills, then grub, harrow the ground, and roll, if necessary, until a very fine mould is obtained. Sow in April one-and-a half stone of gorse seed per acre, and cover it in with a light harrow. The chief point is to work the soil when in a dry and easily pulverized state.—D. S. S.

44. MAKING ASPHALTE WALKS.—In reply to "Agent" in the Notes and Queries of last month as to the making asphalte walks, living within a reasonable distance of the Cranmore Quarries, I obtain from them the mixture known as Asphalte, viz., gravel or stone chips mixed by machinery with tar to a certain consistency, which is then laid by two men upon a properly prepared bed of stone; the Asphalte is separated into two qualities, the rougher and the finer, and laid in two courses, to the depth of 1½ to 2 inches; this is sprinkled with sand and compressed with a heavy roller. Total cost in our neighbourhood varies from 1s. to 1s. 6d. per yard.—EDMUND CRUSE, Land Agent and Surveyor, *Warminster. Wilts.*

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## TRADE LISTS.

**HILL AND SMITH**, 180, Buchanan Street, Glasgow, and Brierley Hill, Staffordshire. This well-known firm present us with an Abridged Illustrated Catalogue of their Patent Black Varnish and Heating Barrow, Patent Flat-Bar Continuous Fences, New Patent Tubular Fences and Hurdles, Wrought-Iron Field and Garden Hurdles, Sheep-Feeding and Sheep-Folding Hurdles, Iron and Wire Fences, Corrimony Fencing, Fencing Wire and Materials, Wrought-Iron Field Gates and Wickets, Tree Guards, Improved Game-Proof Wire-Netting and Sheep-Netting, Poultry Fencing, Plant Guards, Garden Stakes, Strained Wire Espalier, Improved Fittings for Wiring Walls, and a variety of other useful and ornamental iron and wire-work.—**PATRICK MUNRO AND CO.**, 108, West Regent Street, Glasgow. Illustrated and Descriptive Catalogue of entrance and field gates, ornamental railings, wickets and styles, continuous and tubular iron fencing, wire fencing and netting, stable fittings, cast iron pipes, agricultural machines tree guards, and a host of other useful articles more or less in demand on all estates.—**W. AND J. BIRKENHEAD**, Fern Nursery, Sale, Manchester. "Catalogue of Ferns and Selaginellas." One of the best descriptive Catalogues ever published of that lovely tribe of plants. With such a comprehensive treatise to guide and instruct them, no one need ever be at a loss how to select and cultivate a choice collection of the most graceful ferns.—**T. L. MAYOS**, Whitecross Road, Hereford. Abridged List of bedding, greenhouse, herbaceous, and hardy plants, ferns, &c.; a nicely got-up Catalogue of the leading varieties of geraniums, calceolarias, dahlias, fuchsias, petunias, verbenas, &c. The list of pansies is very complete, and Mr. Mayos evidently pays attention to ferns.

*Transactions of the Scottish Arboricultural Society.* Vol. IX., Part II. Edinburgh: Macfarlane and Erskine.

THE opening chapter of this Part is devoted to the admirable address delivered by the retiring President of the Society, the Right Hon. W. P. Adam, of Blairadam, M.P., at the last Annual Meeting, a full report of which appeared in these pages at the time. The next chapter is a particularly interesting one, "On the Teak Plantations at Nelambur, Presidency of Madras, South India," by John Ferguson, Deputy Conservator of Forests. These plantations extend to about 20,000 acres, of which about 3,436 acres are already entirely planted with teak, varying from three to thirty-five years old. Operations were first begun in the year 1840 for the conservation of these forests, but the system of natural reproduction of teak having proved a failure, it was not until 1844 that teak planting on proper principles was fairly started. Since then operations have been carried on with much success, many interesting details of which are given in this well got-up report, which will, we are sure, be read with deep interest by all concerned in a permanent supply of this valuable timber. The report is wonderfully comprehensive, although of necessity in a concise form; and it is to be hoped that it is the precursor of many more essays of a similar nature by those who are actively engaged in forest management in India and the Colonies, and for which the Scottish Arboricultural Society offers good encouragement.

An excellent paper follows, "On the Tools used in Forestry," by Andrew Slater, Overseer, Wyreside Cottage, Lancaster, to which was awarded the prize offered by the proprietors of this *Journal.* A concise description is given of upwards of forty of the tools used by the Forester in the performance of various operations, and each is illustrated by a neatly drawn diagram, from which the uninitiated may easily select the tool that he is in want of, and have it made to pattern by the nearest blacksmith, if he so desires.

"On the Varieties of Trees best adapted for planting as Shelter in the Islands of Scotland," is an able epitome of the best practice of the present time, by Robert Hutchison, F.R.S.E., of Carlowrie, whose valuable hints and suggestions deserve the careful attention of all interested in this very important subject. The recommendations of the distinguished author are evidently the results of careful investigation and great experience, and may safely be followed by those who desire to secure shelter to their crops, and add beauty to their homes, on our storm-swept coasts and sea-girt islands.

The following chapter gives a very interesting account of the "Old and Remarkable Trees on the Hampton Court Estate, Herefordshire," by Thomas Hogg, Forester; particulars and measurements being given of about three dozen remarkably fine specimens of various kinds. A magnificent English elm is stated to be 110 ft. high; 24 ft. 9 in. in girth at 1 foot from the ground; 15 ft. 11 in. in girth at 5 ft. up; 26 ft. in height to forks of main branches, and contains 323 cubic ft. of timber. A Wych elm is 70 ft. high; 27 ft. 6 in. at 1 foot from ground; 20 ft. 2 in. at 5 ft. up; 10 ft. in height to first branch, and 40 ft. to spread of branches; and contains 569 cubic feet. Several pollard oaks are about 25 ft. in circumference at 5 ft. up; a yew, 12 ft. 9 in. in girth at 5 ft. up; and one giant of a Lombardy poplar towers aloft to the extraordinary height of 160 ft.

The next two essays are "On the Rearing and Management of Hardwood Plantations," by Thomas Wilkie, Forester, Ardkinglas, Inverary, and Lewis Bayne, Forester, Kinmel Park, Abergele, North Wales. Mr. Wilkie's is a somewhat ambitious essay, the practical details being discoursed in a colloquial manner. In describing the special conditions under which hardwoods attain the largest dimensions in Scotland, the author assures the reader that "the details, as a whole, have been worked out carefully, and are generally reliable." Among other hardwood trees of which special mention is made in the essay, it is said that "The Plane (*Platanus orientalis*) generally grows to a height of 60 feet when moderately sheltered. It is found of large size on all kinds of soils throughout Scotland," and "is frequently found growing well at elevations of 500 and 600 feet." The sycamore (*Acer pseudo-platanus*), is commonly known as the "Plane-tree" in Scotland, and the remarks just quoted point to some confusion between the trees; else the Oriental Plane has been hitherto much underestimated as a forest tree in Scotland. Again, *Ulmus campestris*, the English "Elm" is specially noticed, and the much commoner and equally useful Scotch elm (*Ulmus Montana*) is not mentioned. Such "details" require to be "worked out" a little more carefully.

The essay by Mr. Bayne shows evidence of a thorough knowledge of the subject, and should be carefully perused by the inexperienced, who desire to obtain sound practical advice.

Another very interesting report on the "Old and Remarkable Trees on the Estate of Ardkinglas, Argyleshire," is furnished by Thomas Wilkie, and shows to what splendid dimensions many kinds of forest trees attain in that part of the highlands of Scotland. Gigantic silver firs reach a height of over 120 feet, and one notable "Monarch" which girths 18 ft. 2 in. at 2½ feet from the ground, is computed to contain 1,250 cubic feet, including bark and branches, and estimated to weigh 57 tons, as it stands. The half dozen beautiful illustrations which accompany this paper add immensely to its value and interest, and form a feature worthy of general adoption in these reports on old and remarkable trees.

The able papers read at the last general meeting of the Society, by Messrs. M'Laren and M'Corquodale, on the question, "Has Scotch Fir deteriorated in Quality during late Years?" are next given in detail, and clearly prove that the true Native Scotch pine is *not* degenerating. "An Improved System of Book-keeping for Foresters and Landstewards," forms the subject of a useful paper by D. F. M'Kenzie, Forester, Murthly Castle, Perthshire, who explains his system by easily understood examples, combining accuracy with more than ordinary simplicity, a great recommendation to busy men.

In continuation of a former paper on the same important subject, "Meteorólogical Observations in connection with the Influence of Forests on Climate," a report is given of the observations made at Carnworth, Lanarkshire, 1878, by Alexander Buchan, M.A., F.R.S.E., Secretary of the Scottish Meteorological Society. Several valuable conclusions are pointed out, and excellent suggestions made for farther investigations of a specially useful nature, which it ought to be the duty of the Society to carry out in future years.

In an appendix is given a list of the Members of the Society, and the subjects offered for competition during 1879—80. Among the latter, a prize of Three Guineas is offered by the Proprietors of the *Journal of Forestry*, for an essay "On the value of Tree Planting as an investment, with statistics of cost and returns," which in these times ought to bring forth much information of a really useful nature to the land-proprietor and his forester. No less than twenty-eight subjects are named for competition, which shows the deep interest taken in Arboricultural matters at the present time, and the anxiety of the Council of the Society to meet all possible and legitmate wants, so far as circumstances will permit and its means allow.

*Transactions of the Highland and Agricultural Society of Scotland.* Fourth Series, Vol. XII. Edinburgh: William Blackwood & Sons.

THIS volume opens with an exhaustive report "On the Agriculture of the County of Sutherland," by James Macdonald, Aberdeen, who is well known as an able and intelligent writer on all agricultural matters. This report is drawn up with his usual skill and ability, every matter in the county of interest to the agriculturist and landowner being noted and described with concise precision. From want of recent statistics of a reliable nature, the author has not much to say anent the nature and extent of the woods in the county. A short extract will give the gist of all that can be said about them, until some future reporter goes more deeply into the matter. "In 1853 the area under wood was estimated at 10,812¼ acres, but according to a Board of Trade return in 1872, it was then only 7,296 acres. The natural clumps of trees and shrubs along the straths in the interior have been gradually disappearing, and it may be that a greater area of these was included in the estimate of 1853 than in that of 1872. About the beginning of this century, the extent under plantations of fir and hardwood was estimated at about 936 acres, and under natural wood in the straths of the several rivers and rivulets, at 1,350—making in all, 2,286 acres. Between 1836 and 1842, new plantations, extending to 2,091 acres, were formed by the Duke of Sutherland, at a total cost of £2,344. Since 1872 the area under wood has been considerably increased by new plantations formed in connection with land reclamations."

"Experiments with Soluble and Insoluble Phosphates and Nitrogen on the Growth of Turnips," forms the subject of a carefully-got-up paper, by Thomas Lawson, Sandyford, Kerriemuir, and affords an instructive chapter to the agriculturist. "Improvements on the Estate of Denbrae, Fifeshire," by David Watson Wemyss, Newton Bank, St. Andrews, who is also the proprietor of the land upon which the improvements were executed, and which were carried out under his personal superintendence. Roadmaking, draining, reclaiming, building, and other judicious improvements, appear to have been carried out with energetic perseverance and complete success. After an expenditure on these operations of £2,500, the rental of a worn-out and dilapidated farm, of about 300 acres, rose from £250 to £400 a year, or an annual interest of 6 per cent. on the money laid out. An interesting essay, "On the Cheviot Breed of Sheep," by David Archibald, Duddingston, South Queensferry, will be welcomed by all admirers of the celebrated breed of grazing stock.

Two more papers "On the Remarkable Trees in Scotland," by Robert Hutchison, of Carlowrie, appear in this volume. The trees here treated upon are the Ash, *Fraxinus excelsior*, and the Sycamores, in Scotland; the history and particulars of which are fully described with the author's well-known careful investigation and accurate detail. In the interesting and carefully compiled tables accompanying each report, we note that the tallest ash recorded is growing at Mount Stuart, in the Island of Bute, at an altitude of 25 feet above sea level. It is 134 feet high; 36 feet in length of bole; 12 feet 1 inch in girt at 1 foot from the ground, and 9 feet 6 inches at 5 feet up. The soil is sandy, subsoil rocky, with an open exposure. The tree is decaying on one side at 6 feet from the ground. Many ash trees in Scotland appear to reach a height of 100 feet or more. Several of the largest trees appear to be mere shells, and are of little value, although the girt of one gigantic bole is stated to be 40 feet at 3 feet from the ground. This immense old tree grows near the church of Logierait, Perthshire, and still continues to live and thrive, although the hollow bole has been formed into an arbour, large enough to hold several people with comfort and ease. In the table of Sycamores, *Acer pseudoplatanus* (erroneously known as the "Plane tree" in many parts of Scotland), the tallest tree is stated to be growing in the open park at Castle Menzies, Perthshire, where it forms a very handsome tree. Its height is 104 feet 3 inches; length of bole, 35 feet; circumference of stem, 25 feet 3 inches at 1 foot from the ground, and 18 feet 4 inches at 5 feet up. It grows at an altitude of 250 feet above sea-level, in light sandy loam, on a sand subsoil. A sycamore grows quite vigorous and healthy near to the sea, at Lyninghame, East Lothian. It is 80 feet high, with a bole 37 feet in length; girthing 23 feet 6 inches at 1 foot from the ground and 20 feet 10 inches at 5 feet up. This is undoubtedly a magnificent example of a forest tree, and proves how suitable the sycamore is for planting within the influence of the sea breeze. Space forbids more extracts, but we strongly advise all who take a pleasure in studying tree lore, to peruse these deeply interesting records. Another report "On the *Abies Albertiana* and its Value for Planting in Scotland," and still another "On the Effects of the Severe Frost and Winter of 1878-79 on Trees and Shrubs," are from the same able and facile pen, and both are full of details and remarks that will be much relished by the keen arboriculturist. The largest specimens of *Abies Albertiana*, or the Californian Hemlock Spruce, are two that are growing at The Carnies, Perthshire. They were raised from the first seed sent to this country by Jeffrey, in 1851, and have now reached a height of 46 feet, with a stem girthing 4 feet 5 inches at 5 feet from the ground, and a spread of branches measuring 40 feet in diameter.

The summary of losses among Conifers and other ornamental trees in the severe winter of 1878-79 is a lamentable one, to which must now be added many which have succumbed under the severities of the past trying winter. The record is an interesting one.

A noteworthy example of successful tree-planting on an extensive scale is ably explained by George Grant Mackay, of Glengloy, Kingussie, in an essay—"On Plantations on the Estate of Glengloy, Inverness-shire." The estate is situated in Lochaber, in the south of Inverness-shire, lying on the shores of Loch Lochy, 90 feet above sea-level, and rising at the highest point to an altitude of 2,103 feet. The soil is a good loam, resting on an open porous subsoil, and is thought to be specially adapted for growing larch. The total area of the estate is 5,464 acres, of which 1,295 acres were planted in the three years 1877 to 1879. The plantations are fourteen in number, and are situated at an average altitude of 500 to 800 feet. The plants were inserted about 4 feet apart, on the slit method. The total number of plants used was 3,218,650; comprising 1,765,000 larch, 1,040,000 Scots fir, 350,000 spruce, 20,000 black Italian poplar, and 43,650 various kinds of hardwood. The total expense incurred was £4,649 8s. 2d., or £3 11s. per acre; including 20 miles 922 yards of fencing, costing £1,270 13s. 8d., or nearly £1 per mile. The unusual extent of fencing is accounted for by the number of enclosures, some of which are of limited extent. These plantations are already growing rapidly and well, and the reporter is of the opinion "that from every point of view there is no kind of improvement on an estate at all to be compared with planting. It is at the same time the most beautifying, most beneficial, and most profitable." As evidence of that opinion Mr. Mackay has planted within the last twelve years, besides the above, upwards of twelve millions of trees. One plantation on the estate of Strathkyle, in Eastern Ross, contains about eight and a half millions of plants, and extends in one block to 3,950 acres, enclosed within a ring-fence upwards of 20 miles in length. Such an example is worth following by owners of extensive waste and inferior lands. Forest conservators of other countries might here find a lesson in the cheap and expeditious planting of extensive tracts with the most successful results.

An essay "On the Replanting of Woodlands," by Thomas Wilkie, Ardkinglas, Inverary, is verbose colloquy upon "The Beetle and Fungoids" —whatever they may be !—but gives no definite opinion on the important subject of "The Replanting of Woodlands."

The different methods of "Making and Curing Butter in this Country and Abroad," is comprehensively treated by John McCulloch, Denbie Mains, Lockerbie; and a well-written short paper, by John Mackie, Upper Bandeath, Stirling, gives an interesting account of the "Reclamation of Land from Moss," on the well-known Blairdrummond principle of floating the moss away with water. To the scientific agriculturist, the reports on "A Visit to Rothamsted," and "The Agricultural Experiments at Woburn," by Dr. Andrew P. Aitken, Chemist to the Society, will have a special attraction, and will well repay perusal by all interested in agriculture. The remainder of the volume is occupied by accounts of the Society's various competitions and experiments, proceedings of its meetings, agricultural statistics, and other matters of interest and importance to the Society and its members.

## OUR FOREIGN EXCHANGES.

There have been received from Bohemia *Haj*, No. 3; *Domacnost*, No. 3; and *Lovena*, No. 3; from Austria, *Oesterreichische Gartenlaube*, Nos. 9, 10, 11, 12; *Wiener Illustrirte Garten-Zeitung*, Nos. 2, 3, 4; *Handelsblatt für Walderzeugnisse*, No. 13; from Germany, *Deutsche Tischler Zeitung*, Nos. 6, 7, 8; *Wochenschrift zur Unterhaltung u. Belehrung*, No. 16; from Italy, *Nuova Revista forestale*, No. 2; from Spain, *Revista de Montes*, Nos. 77, 78; from France, *Revue des Eaux et Forêts*, No. 4.

Besides these, there has been sent from Italy direct to myself, which I desire gratefully to acknowledge, *Guida per il Coltivatore di vivai boschivi con cenni preliminari e nota sulla Materia Forestale di G. M. Adolfo di Beranger.*

In the *Handelsblatt für Walderzeugnisse*, No. 13, is given a report on the forests of Bosnia; the conclusion of an account of the Austrian Foresters' Congress held in the month of March last, and the first of a series of papers on the "Comparative Condition of Forest Economy in Kroatia and Sclavonia in 1877 and 1878."

In the *Revista de Montes*, No. 77, is a forestal sketch of the vicinity of Bagur, a town in the province of Gerona, the extreme north-eastern point of Spain; a report of experiments on the elasticity and resistance of the principal woods of Bohemia, by Professor Mikolaschek, of the Imperial and Royal School of Reichenberg. There is given a translation of the notice in *La Nazione* of the arrangement for forest warders and brigadiers receiving instruction in sylviculture at the School of Forestry at Vallambrosa, referred to in the last number of the *Journal of Forestry*, and there are also notices of the *Filoxera*.

In the *Guida per il Coltivatore di vivai boschivi*, there are given, with details relative to the creation and management of forests, details in regard to the natural history of the trees, indigenous and introduced, cultivated in Italy, followed by valuable notes on the hydrological, meteorological, hygienic, economic, social, strategetic, and æsthetic position and influence of forests, and the negatively beneficial influence which they exercise.

In the *Revue des Eaux et Forêts*, are given a continuation of the papers by M. Goursand, on the *Landes and Dunes* of Gascony, and replies by M. Louis Fortier to nearly thirty questions raised by M. Tassy, on points referred to in his previous papers, on the comparative importance of coppice woods and timber forests.—JOHN C. BROWN.

## REMOVING TREE ROOTS BY DYNAMITE AT MENTMORE.

IN a letter to the *Field*, Mr. J. Smith gives a few practical details respecting the use of dynamite in removing treeroots out of the ground. "In the park here our usual method was blasting them with powder or grubbing the roots up; but this we found a slow, tedious, and expensive process, and determined to try the more expeditious mode of removing them by dynamite.

"In the park at Mentmore, the seat of the Earl and Countess of Rosebery, we have recently been felling trees for the purpose of doing away with the hedgerows, and allowing those trees which are left to develop themselves. Owing to most of the trees having grown in hedgerows, they have formed much stronger roots than if they had been grown in a wood; therefore more labour was necessary to take them out of the ground. The tools required are of simple description: an earth auger, which is similar to an old-fashioned wood auger, 2in. diameter at the bitt end, about 4ft. long, and fitted with a slightly hollowed shield or cap, which the man fits against his chest (this is used for boring holes between the fangs); a crowbar, grafting and stock axe. These are all the implements that are necessary. If a large root is to be removed out of the ground, a hole is made with the earth auger between two of the strongest fangs. This is put in at an angle, so that the bottom of the hole is as near under the centre of the root as is possible.

The hole is then charged with a few cartridges of dynamite, according to the size and strength of the root. A primer cartridge, containing cap and fuse, is then inserted, and the hole filled with loose earth. The fuse is then lighted; this explodes the dynamite, and the whole mass is usually blown out, breaking up the root into convenient pieces for loading up or burning. The fuse is cut before use into sufficient lengths, so as to allow the workman to get fifty to a hundred yards off, according to the strength of the charge. After the charge has exploded, a large hole, much resembling the bed of a boiler, remains. I took particular notice that no damage whatever was done to the surrounding trees. We had nearly four hundred roots got out by this process. With two of our labouring men, and one man sent by the agents representing the Dynamite Company, Messrs. Johnson & Co., Dudley, we have been able to remove from twenty-five to thirty roots, averaging from 1 ft. 6 in. to 46 in. diameter, every day. I find, from careful calculations, that we have been enabled to remove the roots in a far more expeditious manner than hitherto, and at from fifty to sixty per cent. less cost. With ordinary care, dynamite is as safe to use as gunpowder. From my recent experience in its use in removing tree-roots, I can with confidence recommend it for that purpose."

## AMERICAN FOREST PRODUCE.

From an article which lately appeared in the Boston, U.S.A. *Advertiser* upon this interesting subject, and the creation of the Arboretum at Harvard University, of which Professor C. S. Sargent is Director, we extract the following remarks of more than local interest.

The question of the future supply of forest products for America is one of the gravest and most difficult of the practical problems which, as a nation, we shall too soon be called on to solve. In these days a demand for any product sooner or later produces an abundant supply; and so, when the consumption of the natural forests of the continent causes a wood famine and excessive prices attention will be abundantly directed to raising new ones. But, unlike other crops, forests require generations to mature, and between the time when the scarcity of wood is first really felt and the harvesting of the forests which this scarcity must bring into existence, a very considerable period will elapse, during which the demand for forest products must be far in excess of any possible supply. How to raise forests, then, in the quickest and most economical manner will some day be a subject of very considerable moment to the American people. It is a subject which obviously presents serious difficulties. The experience of foreign countries or foreign methods of forestry can help us but little in face of the different climatic, political, and social conditions we shall have to deal with; and an exact knowledge of the best materials for our forest planting and the best methods of cultivating and preserving American forests can only be reached through actual experiments, varied to meet the peculiar demands of each section of the country, and extending through the long periods of time necessary to afford conclusive results.

The late James Arnold, of New Bedford, Massachusetts, with a just appreciation of the future needs of the country, has enabled Harvard University to establish a great Arboretum on its Bussey-farm property in West Roxbury, and to create in connection with it a Chair of Arboriculture, the first of its sort in the United States. This bequest has placed Harvard in the position to take the lead in all such practical investigations, as well as in the consideration of the difficult and important questions which the complex relations of forests to climate and topography present; and which, so far as this continent is concerned, have as yet received but little serious attention. Had the Arboretum been established in one of the States lying between the Mississippi and the Rocky Mountains, it would have exerted a more immediate influence on planting where planting is more needed than in New England, and where, in spite of very serious climatic difficulties, the most extensive artificial forests of the continent must soon appear. This loss in direct influence in the West is more than made up, however, by the advantages which the connection with a famous university and its location in the midst of a wealthy community procure for it. An Arboretum vastly richer in species, infinitely more beautiful in its individual specimens, might be easily made in the vicinity of Baltimore or Washington. And there is something appropriate in the idea of forming at the national capital a noble collection of trees, but a Massachusetts Arboretum in the experimental capacity will always have this advantage over those of more favoured regions,—that experiments made in it, being conducted under more trying conditions of climate, will afford results useful to a larger area of the country. On the whole, then, Mr. Arnold's choice was wisely made, and his bequest, if managed with ability and energy, cannot fail to affect very considerably the prosperity of the whole country through the influence which the Arboretum must more or less directly exert on American industry.

## USEFUL AND ORNAMENTAL SHRUBS.

To most people, those things which combine use and ornament are doubly valuable. Among trees, though, perhaps, it can hardly be said that any of them are decidedly not ornamental, yet one does not often find in gardens trees or shrubs of the highest utility mixed up with those which are in the highest degree ornamental. For instance, apple and pear trees, gooseberry and currant bushes, and raspberry canes, are not usually planted for ornament, because, although from a useful point of view their attributes are of the highest order, the same certainly cannot be said of their ornamental qualities. My object now is to call attention to two plants which, while they are equal in usefulness to those just named, are well entitled to take rank as decorative objects with the purple beech, the variegated acer, or the golden elder. They are the purple filbert and the parsley-leaved blackberry. The former is a purple-leaved variety of the red filbert, producing fruit of equal quality with it, and which, when fresh gathered from the tree with the husks on, are of far superior appearance for the dessert to the fruit of that variety. The colour of the leaves is similar to that of the purple beech, and makes a fine contrast to such trees and shrubs as the variegated acer, the variegated cornus mas, golden and variegated elders, and others with golden, silvery, or green leaves. The latter is a vigorous-growing variety of the common blackberry, with very deeply laciniated and serrated leaves. In ordinary garden soil it makes shoots from 8 ft. to 20 ft. long in one season, and these, when tied to tall strong poles, and treated in much the same manner as raspberry canes, produce fruit in the greatest profusion, of larger size, and much more juicy than the blackberry of our hedges, and which are most excellent for preserving or in tarts. The exceeding beauty which the deeply-cut and delicately-serrated leaves give to the plant is much increased when it is loaded with its large clusters of rich black fruit.—G. E. Ewing, in *The Garden.*

## ABIES VEITCHII.

In a series of valuable articles on Japanese Conifers, by Dr. Masters, which are appearing in our able contemporary, the *Gardeners' Chronicle*, the following interesting particulars are given about this desirable species of Silver Fir. Two or three different plants are called *Abies* or *Picea Veitchii* in the nurseries which have no claim to such an appellation. Messrs. Veitch alone, so far as we know, are the happy possessors of living plants of this beautiful and very interesting Silver Fir. As modern botanists do not seem inclined (as we certainly are not) to follow Parlatore in "lumping" into one genus Pines and Spruces, Silvers and Larches, Cedars and Hemlocks, the name *Veitchii* may happily be retained for "this most remarkable species," which was described by Lindley under *Abies*, and not under *Picea*, as supposed by Carrière. "I have named it," says Dr. Lindley, "after Mr. J. G. Veitch, whose great merit as a very energetic explorer of the vegetation of Japan it gracefully records." We should have been grieved to have had to disturb this arrangement, and are proportionately pleased to be able to retain in connection with so beautiful a species the name of its discoverer.

The plant has been well described from dried specimens by Murray so that all that it seems necessary to add now is the account of the male inflorescence which is present in some of Mr. Maries specimens, and which has not previously been observed.

Male catkins about a quarter of an inch long, raised on a stipes of equal length emerging from a scaly bud, the bud in question springing from the wood of the second year; anthers stalked, connective, developed into a saddle-shaped flap, from the back of which projects a horizontally spreading or deflexed spur-like process.

The disposition of the resin canals in the midst of the ground tissue of the leaf, as in *A. brachyphylla*, has been well described and figured by MacNab, and is in itself sufficient to distinguish the present species from *A. homolepis*, which in gardens has been mistaken for it. But the dense elegant feathery foliage, the blunt emarginate rarely acute leaves, the small erect obtuse cylindrical cones with concealed bracts, and the deeply falcate scales, all serve to render this species easily recognisable. Mr. Maries speaks of a green-coned variety, and of a purple-coned variety, but this may possibly be an affair of age, season, or locality.

Schmidt considers *A. sachalinensis* to be a variety of this species, but if the reader will turn to the figure of that form as given at p. 589 of the present volume of the *Gardeners' Chronicle*, he will, we think, agree with us in considering that, for garden purposes at least, the two are quite distinct, and Mr. Maries assures us that the two trees are widely different in habit and appearance, and in the length of the leaves. *A. sachalinensis* is a lowland tree, growing not only in Sachalin, but also on the south-east coast of Jesso, while *A. Veitchii* occurs on the central mountains of Japan, rarely below 5,000—6,000 feet. It should, however, be said that we have seen cones of *A. sachalinensis* from Mr. Maries since we saw those figured at p. 589, and that these cones, in form and in the degree of prominence of the bracts, offer intermediate stages between true *A. Veitchii*, in which the bracts are all shorter than, and therefore concealed by, the scales, and true *A. sachalinensis* in which the bracts are all prominent. The leaves of the young sterile branches of *A. Veitchii* are much longer and more slender than those on the cone-bearing branches, and hence resemble those of *A. sachalinensis*. While, therefore, for garden purposes we keep the two species distinct, we shall not quarrel with those botanists who regard the one as a variation from the other. If Maximowicz's *A. nephrolepis* be, as we believe from a comparison of the types that it is, the same as *A. Veitchii*, then the species in a wide sense has a rather extended range, from Sachalin to Yesso, Japan, and the mainland of Manchuria.

## THE KURAM AND HARIAB VALLEYS.

In a practical point of view, says Dr. Aitchison, who has recently returned from Afghanistan, the great value to be attached to a botanical examination of the Kuram and Hariab valleys is its vegetable products, and the value they may possess for any export trade. The first of these is timber. The Deodar, our finest Indian Himalayan timber tree, forms dense forests, many of which it will be found can be easily worked. There is at present no limit to the amount and quality of this timber that can be obtained: means of exportation and forest conservancy are the subjects that now require to be studied.

Deodar timber used to be exported from near the Kuram river in Mongul territory by floating down the Kuram *via* Thull to near Banu, but this has for some years been given up.

In grain these valleys have heretofore had no export trade, producing no more grain than was absolutely required for local consumption. I may say the same of their fruits, except perhaps Walnuts and Amlok (*Diospyros*). The cause of this is simply oppression. There is land enough to double or treble the produce.

With a very little more than ordinary care of the water as it is expended, one-third more ground could be brought into cultivation; by appliances of a cheap nature, as wooden troughs, one-third more; and more expensive plant would enable it to be doubled.

The very first effects of our rule in this valley will show itself even this season in there being grain enough for our troops locally produced, and next year exportation will begin to take place towards the Punjab for exchange for cotton goods, which are at present expensive.

I cannot come to any opinion as to whether the nuts of Gerard's Pine (*Pinus Gerardi*) were exported as a real trade article from the Hariab. I know that it is so from Khost.

The natives use no oil, splinters of the roots of Gerard's Pine, or of the stems of *Pinus excelsa*, being used in place of lights. A crude tar is made from the roots of the above pines for local use. This is their nearest approach to oil. It is employed for local application to wounds and sores.

A little silk is produced at Shaluzan and some other villages; but in this there is no trade.

Probably the substance in which most trade is done, both on a large scale and barter, is honey. This is extensively exported by through-carriers to Kabul and the Khost country. Nearly every house in a village has its bees, from Kuram to Ali Khel.

In a scientific point of view, the great value of a thorough and careful research in the vegetation of this altogether new to science district is the material assistance it will give to the better knowledge of the geographical distribution of plants, and the meeting of the several floras of Europe, Persia, Afghanistan, Tibetan, Himalayan, and Punjab tropical, which I already see radiate round the Safed Koh range as a focus, besides enabling one to obtain a more detailed and extensive knowledge of the peculiarities in the distribution of plants dependent on climatic zones, more or less influenced by a moist or dry atmosphere.

From the 600 species of plants I have already collected, I can see already the immense value likely to accrue to scientific botanists by the collections I am now making, and consider that the Government should permit of the subject being thoroughly worked out.—*Gardeners' Chronicle.*

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ELDER V. CHEMICAL WORKS.—The common elder stands well in the neighbourhood of chemical works, and is largely grown on that account in the neighbourhood of Newcastle-on-Tyne. Mr. W. J. Watson, of the Hall Nurseries, raises annually from 15,000 to 20,000 plants of it from cuttings put in during the months of February and March. The cuttings are about 1 foot in length, and are almost buried in the soil. The majority of them strike root, and are twice transplanted before being sent out. Good bushy plants fetch fair prices and prove a remunerative stock. The wood would appear to be almost impervious to the action of the fumes, generally so injurious to vegetation, that are poured forth from neighbouring chemical works.—R. D., in *The Garden.*

A Gorgeous Tropical Tree.—There grows in the Botanic Garden at Castleton, Jamaica, a tree of *Amherstia Nobilis*, 18 ft. high, and as much through the branches. It is a low-stemmed, much-branched, small tree; and though not in the best of health, owing to the poverty of the soil at its roots, it is highly ornamental and effective, on account of the quantity of immense drooping, loose, ovate panicles, each from 15 in. to 20 in. in length, and from 9 in. to 18 in. in diameter, of scarlet-vermilion leguminose flowers, which terminate and depend from the branches. This tree has been in bloom for two months, and many of its blossoms are still in the bud. The flower is so remarkably beautiful (though, unfortunately, scentless) and so little known, that now, having the opportunity, we may try to interest your readers by briefly describing it. Each panicle, inclusive of the pliant peduncle, is from 2 ft. to 2½ ft. long, and consists of from twenty to twenty-five florets, which are borne on compressed, horizontally-extended, scarlet petioles. From the stigma of each flower to the rachis is a distance of 7 in., and almost exactly half-way between them are two very showy crimson oval-lanceolate bracts, 2½ in. long and 1½ in. in diameter. The floral organs consist of four oblong and linear-oblong revolute crimson sepals, and three (normally five, two being abortive) erect petals; the wing petals being spathulate, 2 in. high, crimson, broadly tipped with canary yellow. The standard is equally high, the lower half long-cuneate, delicate white, marbled with red on the face, abruptly widening into a transversely reflexed blade, which is broadly blotched with canary yellow. But a description such as this signally fails to convey any but the very faintest idea of the gorgeous loveliness of a flower that has already not inappropriately been extolled as "unrivalled" in its beauty. I may remark that the effect of the whole is greatly enchanced by the purplish-brown of the gracefully drooping bunches of young leaves, which hang long and limp from the ends of the spreading branches. This is the only species of the genus Amherstia, and is a native of the Malayan Peninsula.—G. Syme, in *The Garden.*

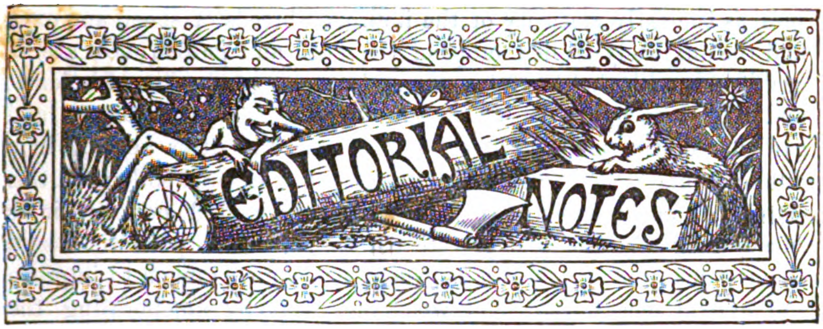
The Weather in the Island of Bute in December, 1879.—We extract the following interesting remarks on the peculiar weather of last December, from an excellent record of the *Meteorology of Bute*, for the year 1879, by Mr. James Kay, forester, &c., on the Bute estate. He says: "The weather during the month (December) has been marked by several distinct, if not remarkable changes. During the first week there was frost, which was followed by mild, foggy weather, without rain. The latter half of the month was dull and mild, with fierce gales on the 27th and 28th. Upwards of 1,000 trees and a number of stacks were blown down, and other minor damage done over the Island. I may remark that the principal damage caused by the storm on the night of the 28th December, seems to have taken place during two separate gusts or squalls. At first sight it may seem a matter of theory to attempt to give an idea of the direction and force of the wind, unless one had been standing in the midst of the storm the whole time. But we must remember that the handwriting on the wall is as capable of being read to-day as it was two or three thousand years ago. The wreck which the storm has left behind has not only marked its course over the whole country, but the disastrous effects of that ever-memorable night have been indelibly written on the minds of the whole nation. I find on examining the trees which have been blown down over the island, that about one-half are lying N.E., and the other half nearly E. Those that have fallen N.E. have fallen first, and those that have fallen E. have fallen last, which is ascertained from the position of the trees, where they chance to be lying on the top of each other—the position in which they have fallen marking the exact direction of the wind at the time. Another peculiarity of the effects of the storm is that a number of large trees have been snapped right over, in some cases a very few feet from the ground, and in others from 10 to 15 feet—thus indicating the suddenness and great force of the storm.

THE SOUTH AUSTRALIAN FOREST BOARD.—That the Board is doing a good work does not admit of a moment's doubt. Unostentatiously, but surely, it is reducing to system the management of the forests of South Australia, protecting the natural supplies of timber against the indiscriminate and wasteful action of woodcutters and adopting practical and effective measures for replacing such of the timber as has to be cut down for fuel, for fencing, for railway sleepers, and for various other legitimate purposes, by fresh plantations of young trees. The work which the Board has in hand is not only of the highest importance from the point of view of public convenience, but it involves financial considerations of very great weight. By conserving and replenishing the forests it is furnishing the State with a source of revenue which, as years roll by, will, it is fair to assume sensibly help to fill the Treasury coffers. Meanwhile, we are glad to find that the operations of the Board are being economically conducted, while already the income of their department is considerable. From a recently issued financial statement we learn that the receipts of the department for the last six months of 1879 amounted to £2,964, against £2,427 in the corresponding period of 1878. The chief credit of the advance is due to the improvement in the revenue from rents, which stands at £2,639, as against £2,334, but timber also contributes to the increase, the receipts from this source having expanded from £70 in the last half of 1878 to £297 during the last half of 1879. Thus there has been in all a net increase of £537. On the other hand there has been a reduction in expenditure of £440. The Legislature granted for the service of the current financial year an amount of £5,641. In six months only £2,783 have been absorbed, leaving £2,858 for the second half of the year. The outlay in salaries and allowances to officers reached £387, as against £209 in 1878; but there have been savings in other directions, particularly in the wages to nurserymen and labourers and in sundries, which have had the effect already stated upon the accounts for the two periods. We do not lay much stress upon the reduction in outlay, for the expenditure upon plantations ought to be reproductive expenditure, but the Board is entitled to point with satisfaction to the fact that the receipts from its department already are more than sufficient to meet expenses. We look forward to the time—not many years distant—when the excess of income over expenditure will be reckoned by thousands in place of hundreds of pounds.—*Adelaide Register.*

MAMMOTH GUM TREES.—The ranges are covered with a dense forest of gum trees, in many places of enormous height, standing with their smooth trunks close together, and running up often for a height of 200 feet without giving off a branch. The light-coloured stems are hung with rugged strips of separated bark. The great slenderness of the trunks of these giant gum trees in proportion to their height is striking, and in this respect they contrast most favourably with the Californian big trees, which in the shape of their trunks remind one of a carrot upside down, so disproportionately broad are they at their bases. The large species of gum tree, the tallest tree in the world, is Eucalyptus amygdalina. As Baron von Muller says, "the largest specimen might overshadow the pyramid of Cheops."—*Notes of a Naturalist on the "Challenger."*

THE WOODS AND FORESTS OF PERTHSHIRE.—We understand that arrangements have been made for the appearance in the *Perthshire Constitutional*, of a series of articles on the woods and forests of this famous county. While the technical part of the subject will not be neglected, the main object will be to present a popular narrative of what has been done in the way of planting in Perthshire during the past century, and to give, at the same time, an account of the more remarkable trees in the county.

HUNTING IN EPPING FOREST.—Mr. Whittington forwards to *Land and Water* the following curious communication in reference to hunting, "&c." in Epping Forest:—"The Epping hunt is an illegality, and as such declared, etc., by the City Solicitor, and so abandoned by the Corporation of London. Their right of chase, as granted by Henry III., was in Middlesex—Enfield to Finsbury. The new Ranger, by and for Crown rights and duties, etc., *must thus keep and use hounds*, and these will probably, as properly, be of the slow foot order, for hunt of *otter*, deer, and hare back into forest lair, etc., of Hainault and Epping, etc. That is a popular and proper procedure enjoyable by the public *on foot* along the many waters *and miles of pasture;* thus there, without injury to any interest, 'hawking' divers birds of those lands and waters is part of the Ranger's office, etc., and may be as *easy* and *pleasingly* pursued by those overts, affording healthy pastime too, for, and by those dames and damsels who incline to be Daphne-Dianic with retriever, spaniel, and small hawk. As to the Hornbeam, the trees of that order are cut down to *pollards*, as are withies and willows, for producing annual shoots of feeding stuff for the winter and spring, cutting and eating by the deer, hare, cony, and king's cattle, etc., there. The timbers of these trees are valuable for and by turnery, etc. *Limitation* to destruction of the *wild birds* and beasts, and *preservation* of *certain* places by prohibition of any molestation there, so to operate for safe retreat, also to mate and perpetuate, is *part* of the office, etc., of the Ranger. He having like control of the waters and fishes, as well proper protects of the *wild fruits* of all verts—so for coverts and feeds of his birds there; there being many farther matters of and for Ranger's cares, the office is not a sinecure, nor for mere sport, to which he has right on part and in protect of sovereign, succession, and nation." It is but fair, etc., to be made aware the means and measures by which "*considerable increase of deer*" "there since Corporation of London became custodian." Mr. W. continues, that can so be only by due and true restoration (so ordered by him as proto forester, etc.), by substitutions for the scandalous and lawless destructions by members of the corporation and their illegal killers termed keepers.



# EDITORIAL NOTES

In discussing the subject, whether or not it is judicious and profitable for a landowner to plant with forest trees the inferior portions of his estate, meaning thereby waste land and all such parts as return a rental below a certain sum per acre—varying according to different views and opinions from a merely nominal value to a rate of twenty shillings or more per acre—much has been said in our own pages and those of our contemporaries upon many points of deep interest to landowners who intend to begin planting, with a view to obtaining within a reasonable time a fair return for their outlay, and a permanent increase in the annual value of their property. That both these desirable objects can be successfully accomplished by systematic and judicious planting upon almost every landed estate in this country, is a matter which no one who thoroughly understands the subject will for a moment attempt to dispute. Still there are many who, through lack of knowledge, or the want of a good practical example to excite their attention and prompt them to follow, are hesitating about whether they ought to plant their less valuable land, or accept the inevitable reduction in the rents paid for such land by agricultural, grazing, or even sporting tenants, in these times of severe commercial and agricultural depression. Plantations, when formed with judgment and skill, have proved in every instance to be highly beneficial to the district in which they are situated, and where they have been managed by careful and experienced men they have never failed to be remunerative in a high degree to their fortunate owners. With the knowledge which we at present possess of the science and practice of forestry, quick and profitable returns are frequently obtained where the plantations are carefully managed and their produce disposed of or utilized to the best advantage. Under a special and well-regulated system of education and training for our foresters, so as to duly qualify them in every branch of the science and art of forestry, the early productiveness of the plantations under their charge will be as certain a result of good management, on educated and sound principles, as the early maturity of the improved breeds of sheep and oxen and the anxiously-tended crops of the field and garden now are, in accordance with the careful study and teachings of cultural science, and the consequent vastly-improved practice of the farmer and gardener of the present time. Considering the utter neglect, in a public point of view, from which forestry has suffered so long in this country, compared with that of most continental nations, it is encouraging to think that private enterprise, and a patriotic desire amongst many of our best landowners, has done so much to improve and extend our forests and woodlands, thereby ameliorating the asperities of the country, affording a much-needed shelter to food crops, adding largely to the supply of remunerative labour for the working man, and greatly increasing the general productive economy of the nation.

Instances of successful and extensive planting are by no means a rarity among our enterprising landowners, and one particularly noteworthy example, of quite recent date, is given on another page of our present issue. What Mr. Mackay of Glengloy has so ably and successfully accomplished on his rugged Highland estates, must add immensely to their amenity and market value, and it requires no prophet to foretell the largely-increased income which the land so judiciously planted will return to the owner at a comparatively early period. Considering the great extent of fencing, which adds about £1 per acre to the cost of planting (set down at £3 11s. per acre), we must say that the operations of forming these plantations have been carried out by Mr. Mackay in an exceedingly efficient and economical manner, the success of which appears to be already beyond a doubt. Such a spirited practical example, of which the facts are plainly detailed, ought to give confidence to the hesitating owner of inferior land, the value of which for agriculture or grazing is rapidly diminishing, to begin at once a systematic course of planting, upon a scale commensurate with the wants and capacity of his property. From a monetary point of view, the investment is thoroughly safe, and the profits good and sure. Such a thing as failure need scarcely be anticipated, as sound judgment and good management are certain to command success.

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THROUGH the courtesy of Professor Sargent, of Brooklyn, Massachusetts, we have received a preliminary catalogue of the *Forest Trees of North America*. The flora of North America is unusually rich in varieties of trees of great value in the economic arts, and indispensable to the most charming and effective compositions of the landscape planter. As we announced in our March issue, Professor Sargent has been appointed by the Government of the United States to draw up a Report on the Forest Wealth of the States. This report is now in course of preparation, and we are pleased to learn that it is intended to accompany it with a complete Catalogue of the Forest Trees of North America, which will render the report much more valuable to the Americans, and especially so to the inhabitants of other countries, who from scientific or commercial points of view are interested in the forests and forest trees of North America.

The preliminary catalogue now before us has been issued with a view to obtain from every available source as complete and accurate details as possible concerning the indigenous trees of North America, with special reference to their geographical distribution and their economic properties and uses. Information is particularly wanted on the following points:—

1. The extreme geographical range of any species.
2. The region and elevation where any species is principally multiplied and reaches its greatest perfection.
3. The geographical formation most favourable to the multiplication and development of any species.
4. Dimensions of remarkably developed specimens of any species.
5. The common or local name of any species in addition to those already given.
6. The purposes, however unimportant, for which the wood of any species is employed.
7. Products of any species other than wood, such as tannin, charcoal, dyes, potash, edible fruit, forage, &c.

The catalogue now published is admirably adapted to facilitate the collection and preservation of such information. It is printed with alternate blank pages, on which field-notes and corrections can be most conveniently written. Botanists, and all others interested in trees and their products, should avail themselves of the opportunity here given them, by filling up the catalogue with any additional information they may possess about any of the species of trees mentioned, and adding particulars of any North American forest tree which may be omitted in the list. The general knowledge of the points mentioned in regard to the nature and habits of trees, is still so vague and imperfect, that it is necessary for every one who may be possessed of facts and information bearing upon the subject, to furnish them for incorporation in the forthcoming catalogue, so as to render it as complete and exhaustive a list as the nature and importance of the subject demands. Professor Sargent will gratefully receive and duly acknowledge whatever information or corrections may be sent to him, of a nature which will serve to make the final publication exact and complete.

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In a vast and thickly populated country like British India, the inhabitants of which depend so much on the productiveness of the soil for their sustenance and prosperity, it is a matter of the first importance that the fertility of the land be preserved by due attention to the laws of nature, and that the influences of the climate upon the crops of the husbandman should be retained, as far as possible, at their most beneficial medium. Extending from a few degrees north of the equator to thirty-five degrees north latitude, and embracing some of the most extensive plains as well as the highest mountains in the world, the productive capacity of the soil of India is peculiarly liable to be influenced by any undue interference with the balance of nature in providing sheltering forests, which also act as storehouses and regulators of the needful moisture, without which crops are a failure and famine and disaster naturally follow. The success of the Forest Department of India is therefore a matter of vital concern to the future prosperity of that vast empire, and we are pleased to learn from the recently issued Review of the Forest Administration of India for 1878-79, which has just reached us through the courtesy of an Indian correspondent, that the scheme is making steady progress and promises within a reasonable time to be a source of considerable income to the revenue of the Indian Government.

The report is drawn up with much skill by Dr. Brandis, the Inspector-General of the Forests of India, and gives an excellent summary of the work carried on by the Department during the year, with many able remarks and suggestions of great value for the future management of the Department, and the profitable working of the forests. Hitherto, the system has been carried on under the disadvantage of having many preliminary difficulties to overcome; the greatest undoubtedly being the want of an institution for the proper training of Forest Officers, both British and Native. Many of these difficulties have been surmounted, and the Department is now in a fair way to show that its existence is not only of a beneficial nature to the country generally, but that by careful and judicious management it can be made highly remunerative as a State investment. It is quite true that up to the present time the Forest Department has not been a paying concern to the Indian Government, and according to the report before us, the financial results of the forest administration, all over India, have been most unfavourable in the year 1878-79. The reasons ascribed for so heavy a falling-off in the forest revenue, or surplus, amounting only to about £18,000 for that year, are, stagnation of trade at the seaports, with the prevalence of drought and famine in many inland districts, and the consequent short demand for timber and other forest produce. These are drawbacks from which every country in the world has recently suffered more or less; but with the advent of more prosperous times, the revenue from the Indian forests may be expected to increase much more rapidly than it has previously done. With the experience gained in the past, and the introduction of the most efficient system of management to suit the nature and wants of each district, greater results will be obtained, and financial success be no longer in doubt. However, we do not think it is at all desirable that other material objects should be overlooked in the hot haste to create a big yearly surplus. The efficient conservation of the forests from undue encroachment and deterioration is the first object to be accomplished, and when that is thoroughly secured, and the necessary planting and other improvements satisfactorily completed, a vast increase in the revenue derived from the forests will undoubtedly follow. The well-known beneficial influences which a duly balanced extent of forests has upon the general prosperity of a country like India, should weigh far more with the authorities in their treatment of the Forest Department than the desire of immediately obtaining a large revenue from the forests by the neglect of rational laws for their protection, necessary extension, and general improvement.

The destruction of forests by fire alone is a matter of serious concern to the Indian Forest Department, which has already exerted much effective control over this subtle and devastating element, and saved from its ravages many thousands of acres of valuable forests, which, in former years, were annually swept and rendered useless by the scourge. In this branch of forest conservancy there is still much to be done, although the Department appears to be doing excellent work throughout India in furtherance of this important object among its other numerous duties.

Nor must we omit to note the mention made in the Report before us, of the institution of a Forest School at Dehra Dun, in the North-West Provinces, for the training of natives in the various branches of Forestry, so as to qualify them for subordinate appointments in the Forest Department; the superior grades being also open to any of them who may prove themselves competent to undertake the duties and responsibilities of the higher offices. This is a step in the right direction, and, combined with an efficient Forest School for the training of British candidates, it cannot fail to be productive, under wise management, of the greatest good to the Forest Department, and of special benefit to India at large. The success of such an institution is of primary importance to the full development of forest conservancy in its most useful form, and no effort should be spared by the authorities to render the training imparted in it as complete and efficient as possible. On the whole we have reason to be satisfied with the good progress made by the Indian Forest Department in the past, so ably detailed in this Report, and to look forward with a prospect of still more rapid progress in the immediate future, since the establishment has now got into fair working order, and can turn its attention more thoroughly to its practical duties.

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THE LATE MR. ROBERT ERSKINE BROWN.—The early death of this well-known land agent occurred on the 11th inst., at Edinburgh. Mr. Brown, who was in his fortieth year, had devoted himself to the advancement of agriculture from a very early age, and his extensive experience, as well as the thoroughly practical nature of his mind, caused him to be known as an authority on agricultural matters. In his knowledge of the management of forest trees he had few equals, and his "Book of the Landed Estate," published by Messrs. Blackwood, of Edinburgh, has taken high rank amongst literary productions of this character. Mr. Brown removed from Wass to Kent, and from Kent to Farnley, near Otley, and afterwards he resided in York for several months. His manly, robust figure was well known throughout the North Riding. All who saw him might readily have predicted a long life for him under ordinary circumstances, and his death at a comparatively early age will be regarded with deep regret by all who knew his kindly disposition, his manly nature, his genuine and unaffected hospitality, and his readiness to assist and oblige anyone that required assistance, or could be indebted to him for an obligation. He was an indefatigable worker, and amidst all his labours, he found time to write for many journals, "Land and Water," "The Agricultural Gazette," "The Yorkshire Gazette," and "Yorkshire Chronicle," frequently being the mediums of his communications. He was a sincere friend, a highly upright and conscientious man, and his loss will long be severely felt. Mrs. Brown died before him, nearly two years ago, and he felt her loss very severely. He leaves behind him three children, and many friends.

THE SAVERNAKE OAK.—Those interested in the charred remains of the magnificent old oak known as "The Duke's Haunt," in Savernake Forest, will be glad to know that great care and expense have been bestowed upon it by Lord Ailesbury, in order to preserve it as long as possible. It has been fenced in, and its enormous branches are bound together with wire ropes, and supported by chains attached to neighbouring trees.—*Land Agents' Record.*

# Science for Young Foresters.

By ALFRED J. BURROWS, Pluckley, Kent.

(*Continued from page* 16.)

The Distribution of Plants.—The plant life of any particular country or district is called its *Flora*, just as its animal life is known by the name of its *Fauna*. Between the two classes there is everywhere a certain inter-dependence, the herbivorous animals subsisting on plants, while the carnivorous prey upon the plant-feeders. In consequence of this it is found that wherever vegetable life is luxuriant and at the same time considerably varied, animal life is also abundant.

As plants are mainly dependent upon heat, light, and moisture, all of which they obtain in the greatest intensity near the equator, the most exuberant vegetation is found within the tropics, and it gradually decreases towards the poplar regions. Other things considered, life is also found to be more dense near the sea level, becoming rarer as we either rise above or descend below this line.

The natural habitat of a plant is that in which it finds all the elements which contribute to its vigorous growth and to its perfect form and development. In speaking of the range of habitat we generally understand the geographical range, which is circumscribed by temperature, light, and heat, and by elevation. Thus in the prosecution of his researches the botanist finds that vegetation radiates from certain centres. It is also seen that the wild luxuriance of tropical jungle-growth is as much owing to excessive heat and abundant moisture as the barrenness of Nova Zembla is due to intense cold. The final distribution of plants is in some degree due to the action of man, to birds, winds, rivers, and tides.

Some idea of the natural distribution is obtained from their arrangement under the heads of aquatic, aërial, and terrestrial. *Marine* plants grow in salt water and float upon its surface, as in the case of seaweed; *maritime* plants grow upon the seashore or within the influence of the sea-breeze; *aquatic* is a name applied generally to fresh-water plants, which may be either lacustrine, fluviatile, or palustrine.

Trees and plants of various kinds may be to a great extent acclimatized, though such change of location is often attended by an entire change of habit; thus the potato, which is a native of tropical America, is found to flourish and become eminently useful in northern Europe. But while in its own country the tubers are small and its propagation is carried on by means of the seed, here the former are large and contain a store of nutriment sufficient for the young plant. Any important change of character such as the above is reversed as soon as plants are restored to their own proper places. Sometimes it is found difficult and even impossible thus to acclimatize plants, and many of those which flourish under the influence of the sea breeze languish or perish altogether when removed inland.

CLIMATE may be considered as the main element in the regulation of the distribution of trees. This in general depends upon the distance of any place from the equator. Within the tropics the length of day and night is nearly equal, and the seasons are known as the wet and the dry, the latter being considered as the summer and the former the winter. But in the West Indies and in some other inter-tropical countries there are two rainy and also two dry seasons in a year. As we approach the temperate zones, the regular succession of seasons—spring, summer, autumn, and winter—commences, and these prevail between the parallels of 35° and 60°. Again, the frigid zone has only two seasons—a long, severe, and partially sunless winter, and a brief summer of continuous sunlight. The above characteristics are descriptive of the general climate in so far as this is dependent upon latitude. But climate is subject to great modifications from *altitude*, which in its turn is influenced by winds, by aspect, or the slope of the land, and by the proximity of the sea. In temperate zones every ascent of from 300 to 350 feet lessens the heat by one degree; and at greater heights and in still higher latitudes the ratio of decrease is even more rapid.

What are known as *insular climates* are such as from the proximity of the sea are cooler in summer and warmer in winter than other inland regions which have similar latitudes and like elevations. Thus the climates of Great Britain, of Tasmania, and of New Zealand, are insular. Such climates as those of the centre of Russia, Germany, and Tartary, are called *continental* ones. Humboldt observes that in the northern hemisphere the continents and large islands are warmest upon their western sides, and in the southern hemisphere upon their eastern.

A great influence upon both the climate and the humidity of a region is exercised by the direction of its chains of mountains, accordingly as these keep out the cold winds or intercept the dry ones. Cultivation has also a marked effect upon climate, which is considerably influenced by the presence of timber and by drainage.

The climate of any country is spoken of either as *geographical*—dependent upon latitude—or *physical*, which depends more upon the situation and aspect. The distribution of species mainly follows the first of these, and the quality and growth of timber the second. The extensive growth of timber in any district tends to minimise changes, as the temperature in summer is lowered by the shade of the trees, while the checking of terrestrial radiation in winter considerably decreases the cold. Forests also break the force of the winds and give a more humid atmosphere.

Any one country may present great varieties of climate which are characterized by as many distinct growths of trees. In France 330 feet of elevation reduces the heat equivalent to one degree of latitude; and Professor Bagneris, who has devoted great attention to the timber growths of that country, divides it into the following districts:—1. Hot climate, producing oaks (*Quercus suber*, *ilex*, and *coccifera*) and pines (*Pinus halepensis* and *pinea*); 2. Mild climate, growing *P. pinaster* and *Q. sessiliflora* and *pedunculata;* 3. Temperate, growing oak, hornbeam, and beech; 4. Cold, producing beech and silver and Scotch firs; 5. Very cold, growing the sorbus, pyrus, betula, and the spruce fir, larch, and some pines.

Even in a country possessing so little variation in height as Britain the different elevations exercise a very marked effect upon the growth of trees,—the pine, fir, and birch being found upon the highest ground, next the sycamore and mountain elm, and then the oak, beech, poplar, ash, and chestnut. It is by some approximation to this natural planting, which is sometimes called region planting, that we may hope to attain the greatest success.

Soil also has a marked influence upon the distribution of plants; but upon this point so much has been said in former papers that it is unnecessary to revert to the subject.

In order to indicate the regions of equal temperature a system of marking out the maps by means of isotheral lines (so called from *isos*, equal, and *theros*, summer) has been adopted, and these are so drawn as to pass through places the temperatures of which are equal. It is customary to mark these upon the maps at distances of 10° north or south latitude. By this method the surface of the earth is mapped out into a succession of zones of vegetation which are bounded by isothermal lines, which indicate the mean amount of heat received throughout the year. These zones may be described as follows. (see Diagram).

1. *The Equatorial Zone*, bounded by the isotherm of 79°. Here, wherever the moisture is abundant, growth is luxuriant. The stems are generally succulent, the flowers very large and showy, and the climbing plants or parasites of immense size. The grassy kinds

develop into bamboos and canes, and large orchids and palms abound. Most of the vegetable growth of this zone lies to the north of the equator. It may be described as covered with very dense evergreen forests.

2. *The Tropical Zone*, extending to the isotherm of 73½° on both sides of the equator, and abounding in palms, tree-ferns, cotton, coffee, and sugar-cane, as well as bananas. Here the climbing plants decrease, and underwood becomes more abundant.

3. *The sub-Tropical Zone*, bounded by the isotherm of 63°. This belt is rich in magnolias, myrtles, laurels, figs, palms, cacti, vines, and arborescent euphorbias. The vegetation is for the most part evergreen. The climate of this zone is splendid, but in some places it is rainless.

4. *The higher Temperate Zone*, called also the warmer temperate, and limited by the line of 53½°. There is still an abundance of evergreen trees, but few or no palms. Here are fine forests of deciduous trees,—oaks and chestnuts, olives, pomegranates, figs, oranges, and the vine. These abound chiefly in the zone of the northern hemisphere, while in the southern we meet with araucarias, some ferns, and arborescent grasses.

5. *The lower or colder Temperate Zone*, extending to 42½°. This in the northern hemisphere is the principal zone of forest trees, and in consequence of most of these being deciduous we here experience marked seasonal contrasts. The growths of England and the more northern parts of France and Germany are typical of this region, producing fir, pine, yew, and coniferous trees generally, interspersed with large expanses of heath. This zone is almost the northern limit of the profitable cultivation of wheat.

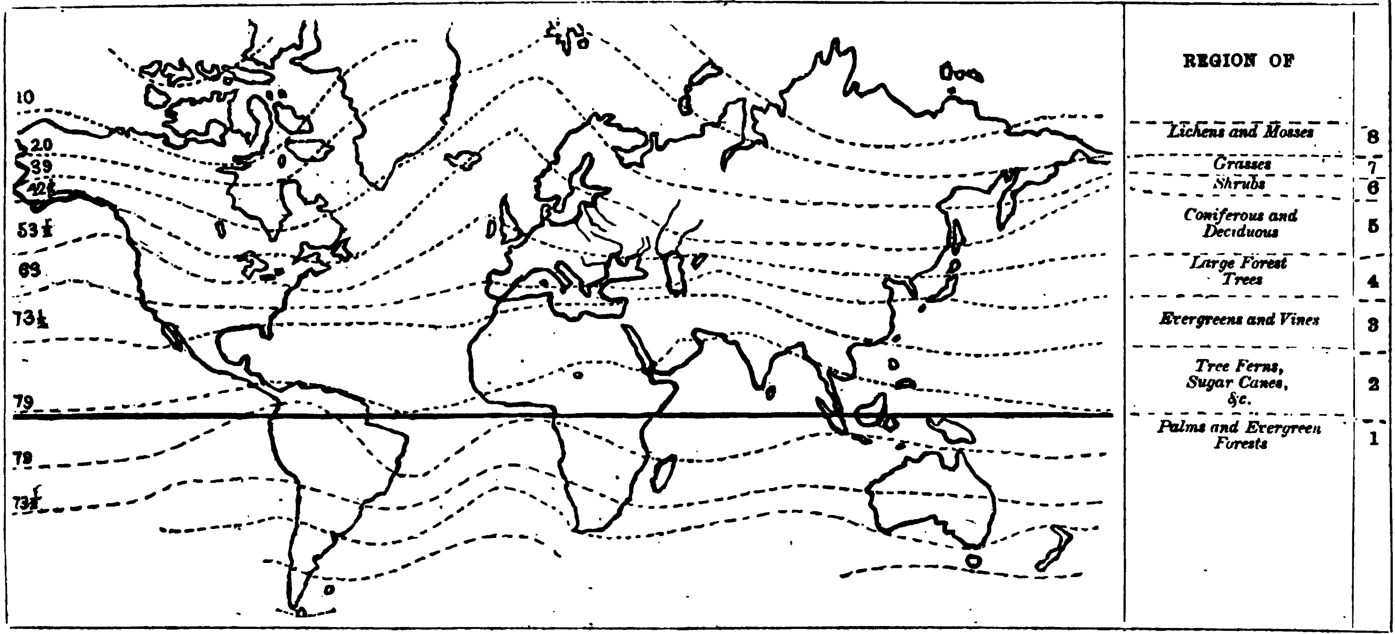
6. *The sub-Arctic Zone*, limited by the isotherm of 39°, and producing pine, larch, spruce, juniper, beech, poplar, heaths and grasses, and in its extreme northern limits birch, alder, and willow.

7. *The Arctic Zone*, which is confined to the northern hemisphere, growing a few pines and firs, together with the dwarf birch, the alder, the willow, some grasses, and gradually giving way to lichens and mosses. In America this zone produces the rhododendron and the azalea.

8. *The Polar Zone*, also confined to the northern hemisphere, and producing only flowerless plants, such as lichens and mosses. Sometimes during its short summer the ranunculus, the rush, and a very dwarf willow spring up, but generally speaking this zone is destitute of all trees and bushes.

The ascent of a lofty mountain displays the successive zones of vegetation much in the same way perpendicularly as we should pass

ISQTHERMS AND ZONES OF VEGETATION.



through them horizontally in going from the equator to the north pole; and as far as temperature is concerned we should pass through a corresponding series of climates. In a country which contains every difference of level, the various productions of those different altitudes may be brought together in one common market. Thus it happens that the markets of towns in equatorial regions are frequently supplied with produce which appears to have been collected from extreme points of the earth's surface. At the market of Bogota, in South America, may be seen on one side hampers of strawberries, apples, and peaches, and close to these piles of pine apples; heaps of cabbages, carrots, and potatoes, alongside yuccas and bananas; piles of cocoa and sugar. between sacks of maize, barley, and wheat; medicinal herbs gathered in the mountains by the Indians, and arranged near these pinks, roses, and jessamines.

In commencing observations at any particular latitude we should find the vegetation beginning with the flora of that parallel and gradually ascending through succeeding zones. Thus if we take the Pyrenees, and commence at the sea level, we find: 1. A zone of oaks. 2. Beech trees. 3. Silver fir and yew trees. 4. The Scotch pine. 5. Dry leaved shrubs and creeping plants, such as the rhododendron, daphne, and dwarf willow. 6. Alpine plants, gentians, primroses, &c. 7. The latter together with mosses and lichens, extending to the limits of perpetual snow.

If we take a higher latitude, such, for instance, as the head of the Gulf of Bothnia, we find: 1. Spruce fir. 2. Scotch fir. 3. Dwarf birch trees, thick and knotty. 4. *Betula nana,* another kind of dwarf birch, and a green willow. 5. Woolly willow and a creeping small birch. 6. Amongst patches of snow a few dwarf shrubby plants. 7. Saxifrage and crowfoot wherever the soil is visible. 8. Amongst perpetual snow if a portion of the soil becomes exposed only for a few days, the icy crowfoot flowers.

The South American flora begins with bananas, cycads and palms at the level of the ocean; next upon the valleys of the Andes, tree-ferns and cinchonas, or Peruvian bark trees; then ivies and andromedas and heaths; then the resin-yielding bejarias, which form a purple belt round the mountains. Upon reaching the Paramos stony region lofty plants and flowering herbs disappear, and are succeeded by large tracts of grasses upon which the llama feeds. We next meet with lichens and thalli, and then reach the limits of perpetual snow.

Humboldt tells us: "We may begin the ascent of the Alps in the midst of warm vineyards, and pass through a succession of oaks, sweet chestnuts and beeches, till we gain the elevation of the more hardy pines and stunted birches, and tread on pastures fringed by borders of perpetual snow. At the height of 1,950 feet the vine disappears; and at 1,000 feet higher the sweet chestnuts cease to thrive; 1,000 feet farther, and the oak is unable to maintain itself; the birch ceases to grow at an elevation of 4,680 feet, and the spruce fir at the height of 5,900 feet, beyond which no tree appears. The rhododendron then covers immense tracts to the height of 7,800 feet; and the herbaceous willow creeps 200 or 300 feet higher, accompanied by a few saxifrages, gentians and grasses; while lichens and mosses struggle up to the barrier of eternal snow."

Plants and trees sometimes abound in tribes, and as such give distinctive features to the countries in which they prevail; thus the tea plant and camellia belong to Eastern Asia, eucalypti to Australia, magnolia to the southern latitudes of North America. Such effects are also produced by the palm, the banana, cactus, willow, and by grasses and heaths.

A tract of country or a district to which certain orders are peculiar, constitutes a botanical region; thus we have regions of magnolias, palms, &c. The natural range of some of these is limited, but on account of their utility or their ornamental appearance, they are transferred from one region to another, sometimes to the partial destruction of the vegetation amongst which they are introduced, and with which they become acclimatized. But generally speaking nature's law prevails, and oftentimes the vigour which such trees displayed in their native habitat is lost. Thus the winters of the last two years have made great havoc amongst eucalypti and some other trees which we began to consider had become acclimatized in Britain.

Tournefort tells us that in ascending Mount Ararat he found the plants of Western Asia at its foot; the vegetation of Italy a short distance up its sides; still higher that of central France; next the vegetation of Sweden; and lastly the plants of Lapland and the Alps.

For the classification of its vegetation the equinoctial regions of South America may be divided into eight zones, which when taken from the level of the sea to the summits of the loftiest mountains maintain the following order:—1. Palms, lilaceous plants, &c. 2. Tree-ferns and cinchonas. 3. Oaks. 4. Shrubs, trees disappearing entirely at a height of 10,800 feet. 5. Plants similar to the alpine plants of Europe, such as gentians, lobelias, and ranunculus. 6. Grasses, continuing to an elevation of 14,200 feet, and snow falling regularly. 7. Mosses and lichens, which continue to the verge of perpetual snow at 15,700 feet.

With regard to the timber of our own country, it is certain that Britain was well stocked with trees even when its population was scanty. As the land came under cultivation the forest had to give way to the plough and the scythe. According to Domesday Book the woods of England were both numerous and extensive. That they consisted largely of oak and beech may be inferred from the fact that they were valued, not according to the timber they would produce, but according to the numbers of swine which could be fed upon the acorns and the mast. In the time of Edward I. we are told that the country was well timbered. But planting either for timber or for fuel was but little attended to until the commencement of the 17th century. From the time that Henry VIII. seized upon the Church lands, in the twenty-seventh year of his reign, the consumption of timber rapidly increased, as oak became extensively used both in shipbuilding and in house construction. Holinshed, who wrote in the reign of Queen Elizabeth, complains that whereas beforetime men were content to build houses with sallow, willow, &c., and to reserve oak for churches, religious houses, palaces, and for navigation, they had now come to use this timber for the commonest purposes. In the time of James I. it was found that the supply of oak timber was in excess of the demand; but during the period of the civil war, in the reign of Charles I., both public and private forests suffered severely.

Evelyn's "Sylva," published in 1664, gave a great impetus to tree-planting. In his dedication to Charles II., Evelyn speaks of the king "as having (like another Cyrus), by your own royal example, exceeded all your predecessors in the plantations which you have already made, and now design, beyond all the monarchs of this nation since the conquest of it."

Among the trees which were introduced into Britain at an early period we have the chestnut, the lime, the English elm, and the beech; and among the fruit trees the apple, pear, and peach.

Turner notices the introduction of the spruce fir, the stone pine, evergreen cypress, sweet bay, and walnut, about the middle of the 16th century, and towards the end of the same century we have the pinaster, laburnum, various smaller trees, the evergreen oak, and the arbor vitæ. Bishop Compton introduced a great many trees at Fulham, and amongst others the cedar of Lebanon in 1683. The *Hortus Kewensis* mentions among the introductions of the 17th century, the cedar, Scotch fir, larch, horse-chestnut, acacia, scarlet maple Norway maple, American plane, the scarlet oak, weeping willow, balsam, poplar, balm of Gilead, fir, cork tree, and the American spruce fir.

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[In the foregoing papers I have written more especially for the information of the rising generation of foresters, many of whom already are, and all of whom should be, readers of the pages of the *Journal of Forestry*. My aim has been to give such a brief outline of the fundamental principles of chemistry, geology, vegetable physiology, and botany, as will enable them to bring to bear upon their every-day avocations an intelligent acquaintance with the scientific principles of arboriculture, without which all their operations upon new soils must to a great extent be conducted in the twilight of uncertainty. "Practice with science" is a motto which should not be lost sight of by the tree-grower. That such scientific knowledge is deemed an essential part of the forester's education in continental countries, where Schools of Forestry are established, may be gleaned from the report of Captain Campbell Walker, who, in speaking of the German system, says—"An Oberförster, and even many of the Försters and Overseers, can tell the name, local and botanical, of every tree, shrub, and plant, classify it and state its uses; inform you of the nature of the soil, to what period the formation belongs, what trees will grow best, and why. All this is known thoroughly, theoretically, and practically."

If these imperfect notes of mine help to lead the young forester to further research and to a more intelligent practice of the noble science in which he is engaged, my principal object in putting them together will be attained.—A. J. B.]

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**Nomenclature of Coniferæ.**—The recently-issued portion of Bentham and Hooker's *Genera Plantarum*, which includes the Coniferæ, being the most recent standard of authority, will probably settle the names and limits of the genera of that order for many years hence. As in De Candolle's *Prodromus* the *Cupressineæ*, *Taxodieæ*, *Taxeæ*, *Podocarpeæ*, *Araucarieæ*, and *Abietineæ*, are regarded as tribes of the order Coniferæ. The larger genera of the Coniferæ, with one important exception explained below, have been left almost as they are understood by horticulturists. *Callitris* includes Frenela, Widdringtonia, and some other less known names; *Fitzroya* swallows up Diselma; *Libocedrus* includes the recently-published Calocedrus; *Thuya* (the spelling adopted), is made to include Biota, Thuyopsis, Chamæcyparis, and Retinospora, this being the greatest deviation from what may be termed the ordinary nomenclature; *Sequoia* supersedes Wellingtonia; *Ginkgo* is retained for the Maidenhair Tree, Salisburia; and *Agathis* replaces Dammara. The *Abietineæ* are divided into *Pinus*, *Cedrus*, *Picea*, *Tsuga*, *Pseudotsuga*, *Abies*, and *Larix*. With regard to the names Picea and Abies, Don misapplied them in Loudon's *Arboretum;* but the authors of the *Genera Plantarum* have correctly returned to Link's original definition, so that henceforth the *Piceas* will be the Spruce Firs, which have persistent cone-scales, whilst the *Abies* will consist of the Silver Firs, whose scales fall with the seeds from the cones.

**Ilex Glabra.**—A Lincolnshire clergyman has sent us sprays for identification of a Holly, *Ilex glabra*, that he informs us has endured the severe frost of last winter better than any other shrub in his garden. The shrub is of dwarf yet free growth, and has large bright glossy leaves and prominent spines. It is bold and attractive in appearance, and is well adapted for planting in cold northerly localities.—*Journal of Horticulture.*

# Are Trees Injured or Benefited by the Decomposition of the Prunings which may surround them?

BY D. McCORQUODALE, FORESTER, DUNROBIN, SUTHERLANDSHIRE.

(*Continued from page* 22.)

FIRST. The injuries done to growing trees by the gases arising from decaying tree matter is a mere fable; just as well reason that mutton is unfit for human food from sheep fattened on turnips, simply because these turnips were manured by the refuse of woollen mills, bone and blood fertilizers.

Tree seeds, Scotch fir for example, are dropped into the ground, and the roots radiate under its surface and away from the light, in every conceivable direction, collecting solubles, and the tops ascending upwards collecting gaseous food; both to be assimilated into Scotch fir timber by the chemical and mechanical actions of heat and sunlight, while thinly passing through their numberless leaves, and the tender bark of their young twigs. Although Scotch firs are evergreen, they annually shed their old, used-up leaves, and the time comes when thinning is necessary, when prunings, and the roots of trees so cut away, are added to the already mass of decomposing leaves, all of which decompose, not unto "fœtid gases," injurious to the growing crop, but unto the separated simple elements of gases, and dissolved inorganic substances; and that in the requisite proportions to each other, in which they so lately composed the live trees, just to be anatomically taken up again as food by the roots and leaves of the surrounding live trees; all handy and ready for use, without incurring the former trouble of collecting them from masses of unsuitable earthy substances.

If we want a proof of this let us go to the fir woods, especially those growing on dry, barren soils; and there we may find (all other advantages being equal) that those grow best where the rubbish remains lying about all undisturbed, yet decaying.

If we now examine this old fir post in this wire fence, we may understand more of the nature of this decay. A little under the surface of the soil, it may be two or four inches, we find the outside of the post composed of a damp, soft, pulpy substance, which decreases as we approach the centre, where it is quite sound and hard. Let us now examine it down from this point, and we will find that the deeper we go the less pulpy or rotten do we find it, until we come to where it is quite sound. When looked at above the surface of the ground, we find the rot does not extend beyond where it is affected by damp from the soil. Here is a proof that decay proceeds most actively where the moisture from beneath and the air from above unite in composing an atmosphere perfectly saturated with water; and that the soundness of the timber increases directly in proportion to the density of the moisture and absence of air under ground; or, above ground, to the dryness of the air and absence of moisture. Another matter we may here notice is that the capacity of the air for absorbing moisture increases in proportion to its heat. At 40° it is damp to saturation with only 2·9 grains of moisture per cubic foot of atmosphere, whereas at 90° it can absorb 14·8 grains; had the progress of decay in this post been carefully watched, it would be found that it proceeded most rapidly as the air increased in heat and moisture. Here we may remark that the air is damp to saturation only in damp, confined places in wet weather, when the air is so chilled as to form dew, or in the damp, deep shade of trees. The free and open atmosphere usually contains only about the half of the moisture we state, and in very dry weather only about one-fourth of that.

Mr. Burrows in his excellent article, "Science for Young Foresters," tells us to the effect that the organic substances of timber dried at 212° contain—

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|---|---|
| Carbon | 49 |
| Oxygen | 44 |
| Hydrogen | 6 |
| Nitrogen | traces |
| Ashes | 1 |
| | 100 |

Professor Alfred Sibson says carbonic acid, ammonia, and water are the substances from which plants mould their organic forms or substances. The statement of the one may be said to refer to the sound part of our paling post, and that of the other to the decaying part of it. Before decomposition began to take place, it was necessary that all the cells of the timber should be in as distended a condition as possible, and this moisture alone could accomplish: yet not so saturated as to chock up these cells, to the entire exclusion of air. Air being composed of about one of oxygen to four of nitrogen mechanically, not chemically combined, and oxygen being perhaps the most actively destructive agent in the universe, leaves the nitrogen in the atmosphere, and aids the oxygen, already forming so large a proportion of the timber, to consume and disintegrate the carbon part of our post, thus forming carbonic acid gas; nor will the oxygen lessen its destructive activity until it finds out the last particle of that light and inflammable gas, hydrogen, so as to unite with it to form water. While all this is progressing, some of the oxygen unites with the nitrogen to form ammonia. As soon as all the hydrogen has combined with the oxygen, the usual dark vegetable mould remains, decomposing more slowly into carbonic acid gas. Mixed up with this mould are the soluble ash constituents of plants; with regard to which see page 764, Vol. III., of this Journal.

Professor Sibson further says, "To decompose water we have always to employ powerful chemical agents. This is because the gases are held together so firmly as to resist all ordinary means of separation. Yet difficult as the operation is to us, with all the appliances of science, the same operation is constantly going on in the leaves of the humblest plant. Plants decompose water as well as other still more powerful mineral combinations, as sulphuric acid, phosphoric acid, carbonic acid, &c., in the cells of their leaves. From the water decomposed in this manner, plants derive their hydrogen," which we have seen may form six per cent. of the perfectly dry substances of trees.

Not only do trees grow the better from the atmosphere which surrounds them being loaded with the gases arising from decaying trees, and from the soil in which they grow being charged with decaying soluble substances; but it will be found to be an advantage to plant the same sort of tree, the same season a crop has been cut away, because the gradual decay of roots help the growth of young trees, the same as partially-rotted dung helps the farmer's crops. An essay by Mr. McCorquodale, of Scone, on this subject will be found in vol. 2 of the "Scottish Arboricultural Society's Transactions," well worth the reading.

True, leaves may be termed the lungs of trees, and so may gills the lungs of fishes, but because a man cannot live like a fish under water, where he would soon be suffocated, his lungs being but badly adapted for water-breathing, why not try and get fish, like man, to live out of the water? Simply because the sudden death of the fish would prove the theory absurd; yet not more absurd than the suffocating gas theory in regard to trees. The purest and therefore to land animals the most invigorating air, contains only one gallon of carbonic acid gas in every 2,500 gallons of air. So much as one in a hundred makes man feel languor, headache, and general oppression. It is poisoning him quickly to death. Dr. Johnson, of New York, tells us, "that when organic matters decay in the soil, their carbon ultimately assumes the form of carbonic acid gas; this gas constantly exhaling from the soil, is taken up by the foliage of the crops, and to some extent is absorbed likewise by their roots; also that all their other wants being supplied, they grow better as the quantity of this gas approaches the $\frac{1}{12}$ of the bulk of the air, by which they are surrounded." Dr. Carpenter, in his "Vegetable Physiology," says, "the proportion of carbonic acid gas in which a healthy plant will thrive under the strong influence of sunlight, is not less than $\frac{1}{14}$ to $\frac{1}{12}$ that of the surrounding atmosphere." Bassingault and Lewy examined the air enclosed in the interstices of various soils, and found it to contain from 10 to 400 times as much of this gas as the atmosphere above the soil did. We may suppose that by "above the soil," is meant above the green foliage, if any, that covers the soil, whether it be that of grasses or of trees.

In order to test this poisonous gas theory, we sowed some Scotch fir seed in partly decomposed Scotch fir sawdust, and at the same time in peat-moss, in which no trace of timber could be seen, with the result that the sawdust-grown plants were the best of the two. The largest part of our home nursery was, six years ago, a forest in which various kinds of common coniferæ and hardwoods had grown to be large old trees; and all we did to the roots was merely to cut away the trunks in the usual manner, then cut away all the root branches that were within a foot of the surface, and buried them close by the main trunk. These stumps are seen all over the ground, and with different sorts of young trees growing close on to them, and that without sustaining the smallest injury.

For the last twenty-two years I have been trying to find even one tree that could justly be suspected of having suffered from foul air, arising from the decaying rubbish of its own or any other kind of tree, but as yet failed, and we have gone the length of collecting their own rubbish in heaps about them and under their shade, but without having any bad effect.

(*To be continued.*)

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**PRUNING NEWLY TRANSPLANTED TREES.**—In the *Bulletin d'Arboriculture* M. K. G. W. Ottlander, nurseryman, Boskoop, prescribes the following rules with respect to pruning transplanted trees. In the first place, trained trees should never be pruned when transplanted, such an operation in their case being very injurious. Standard trees should have the longest branches shortened to one-half their length, provided the necessity for so doing is clearly seen, and the trees fully exposed. Espaliers, pyramids, and stone fruits, with the exception of peaches, should not be pruned at all the first year. In the case of such trees as æsculus, ulmus, tilia, platanus, fagus, quercus, it is advisable to shorten the strongest branches.

# Earth Shelters for Orchards and Plantations.

By D. T. FISH, Hardwicke Gardens, Bury-St.-Edmunds.

On travelling through any given county or country, few things impress the careful observer more than the immense importance of shelter as an aid to growth. Soils and subsoils may be alike, culture and treatment the same, and yet within a few yards or miles the differences in the state of orchard or forest trees may be immense. Here, every growth is of the smallest and most stunted character, and the fruit is small, or inferior, or conspicuous by its absence. There, the trees grow like willows, and the fruit is plentiful, and of the highest quality. In the former case, the planter has taken advantage of the natural configuration of the ground to provide shelter; in the latter, the trees are exposed on all sides.

Of course, in planting on a very large scale, it may often be impossible to obtain shelter for the entire wood; but in ornamental or fruit tree planting, sheltered sites might generally be found were careful search made for them; and if not, nothing would pay better than their manufacture, for the earth is everywhere present, and it forms the best possible shelter.

Considering how easily, and even reasonably in regard to cost, earth may be moved, it is astonishing how very seldom it is moved in sufficient mass to provide shelter for young plantations. Even when mounds have been thrown up, they have seldom been of sufficient height. The configuration, too, is almost of as great importance as the height. The protecting lines should all be more or less curved, the convex side of the mounds being presented to the most exposed points. In a long protecting barrier, of course, certain lines more or less concave must be used. These should, as far as possible, run themselves out in the direction of the prevailing mounds, so as not to send its full force on to one side of the centre. By studying the minutiæ of air currents in special localities, and adapting the resisting line to meet local peculiarities and variations, it is astonishing how much may be done in providing shelter by means of a very few earth-mounds. The mode of forming them is simple enough. First plan what is needful, then skim off a certain amount of the surface soil, and form the base lines of subsoil only. By looking ahead, it will seldom be needful to remove the surface soil to any great distance from where it will ultimately be wanted. As the mounds rise to within six inches or a foot of the height required, case them with the surface soil, and they are ready for planting. The height and mass of the mounds must be determined by the amount of shelter required, and the depth of soil or subsoil. Of course, their formation is only possible where the latter is gravel, clay, marl, sand, or something different from rock. The presence or absence of water, and the means or want of means of removing the excess of the latter where it abounds, will also exert a modifying influence on the size and character of earth-mounds for shelter. In very exposed, bleak positions it may almost be accepted as an axiom, that the higher and more massive the mounds the better. But this statement is too vague to be of much practical value. Mounds from five to twenty feet in height, and from a yard to a dozen yards in breadth, have been found most useful.

Mounds are far more useful than walls or hedges, and the latter are useful for shelter in the opposite ratio to their usefulness for fences. The straight trim hedges of modern times are by no means all gain to plantations or orchards. The stormy winds lost much of their energy and force in passing through the tangled thickets that passed for hedges in the olden times; the two or three yards made up of blackthorn brambles and elder bushes broke the power of the fiercest gale, so that but little of their blighting force reached the plantations beyond. These old jungles of weeds and bushes also showed that the width of the shelter was of almost as much moment as its height. The difference between the outside and the in of such hedges in the early spring-tide, often seemed to cover the entire distance between mid-winter and mid-summer.

By the use of earth shelters we get rid of the weeds, waste, and vermin, and retain more than all the advantages of the straggling, irregular hedges, now so generally uprooted and superseded by straight wire fences and trim hedges.

Wire fences are the worst possible for trees and plantations from the shelter point of view. Even the old wooden pales broke the force of the wind, though not so well as the ruder, wasteful hedges, but wires afford no shelter at all.

In advocating earth shelters, we by no means overlook the cheapest and best of all means of sheltering orchards and plantations—viz., the liberal use of the hardiest and most rapid-growing plants that the locality affords. We should at once crown our earth-mounds with these, and thus, in a very short time, more than double their height and quadruple their efficiency.

The hardier and freer-growing bushes and trees planted on raised banks, also grow with amazing rapidity. The depth and looseness of the earth tells at once on the ratio of growth, and accelerates it in a manner that can hardly be credited by those who have not seen its effects. It may be thought that this aid to rapid growth would be neutralized to a great extent by the additional exposure that plants are subjected to in a more elevated position. But in practice this is not found to be the case. If a suitable selection is made, it is seldom indeed that the plants refuse to thrive on elevated artificial banks. The white and black thorns, beech, birches, maples, and such pines as the common Scotch and *Pinus Laricio* or Corsican Pine are among the most useful plants for exposed localities. Of course, the whin, broom, and near the sea coast the tamarask are also admirably adapted for the clothing and crowning of artificial mounds.

But the chief object of this paper is to direct attention to the importance and efficiency of mounds of earth, the natural and most readily available protectors of orchards and plantations in exposed localities. Of course, as a rule, these banks would naturally be clothed with vegetation for pecuniary and artistic reasons, as well as to add to their efficiency as shelters.

PRESENTATION TO A FORESTER.—It having become known that Mr. Jas. Barton, assistant-forester on the Lynedoch estates, Perthshire, had received the appointment of forester to the Marquis of Salisbury, on the Hatfield Estate, a meeting of his friends was held in Pitcairngreen, for the purpose of making arrangements for expressing in some tangible form the respect and esteem in which Mr. Barton was held in the district. A committee being formed, a handsome sum was soon collected, with which it was agreed to present Mr. and Miss Barton with suitable mementoes of their friends' esteem; and the presentation duly took place in Pitcairngreen Inn, on the 14th ult. Mr. Stewart, Moneydie, in making the presentation to Mr. Barton, referred to the great pleasure it afforded him, in the name of the subscribers, to have this opportunity of showing, in some small measure, the respect and esteem in which their friend was held by the inhabitants of the district in general, and by the members of the committee in particular; and that in conferring this honour upon Mr. Barton, they were conferring an honour upon themselves. Mr. Robertson, in making the presentation of a gold brooch to Miss Barton, specially referred to the high esteem in which she was held by all who knew her, and the friendly relations that existed between her and all with whom she came in contact. Mr. Barton, in replying for himself and Miss Barton, expressed the deep sense of gratitude he owed to all the subscribers, and particularly to the members of the committee, for the great honour done him that evening—an honour altogether unexpected on his part; and, speaking for his sister, he was sure their valuable present would be to her a source of much pleasure indeed. He begged to thank them all most sincerely for their kindness. Afterwards the company sat down to supper, and spent a most pleasant and enjoyable evening.

# Plantations on the Estate of Glengloy, Inverness-shire.*

By GEORGE GRANT MACKAY, of Glengloy, Kingussie.

The estate of Glengloy is situated in the Lochaber district of Inverness-shire, on Loch Lochy, in the line of the Caledonian Canal. The lake is 90 feet above the level of the sea; the highest point on the estate is 2,103 feet. The ground is very steep, and covered with excellent green pasture. The soil is a good loam, resting on open porous gravel, and is thought specially adapted for growing larch.

The estate was purchased in 1875. The total area is 5,464 acres, of which 1,295 acres have been planted during the last three years. The lands being entirely in the proprietor's occupancy as a sheep farm, he was able to plant wherever he thought proper. While, therefore, large areas have been planted at both extremities of the property, eleven smaller plantations have been formed, with a view partly to providing shelter for sheep. By thus forming a number of smaller plantations, instead of one large one, the cost of enclosure is much increased, and further, from breaking up the continuity of the sheep walk, the immediate value of the adjoining grazing lands is reduced; still, ultimately it will be of great importance to the estate for grazing purposes, apart altogether from the value of the timber.

The various plantations, thirteen in number, are as follows:—

| | | |
|---|---|---|
| Stronagloy | 560 acres | Planted, 1876—1877. |
| Tarsuineas | 450 ,, | „ Spring, 1877. |
| Fallbelt | 6 „ | „ Autumn, 1877. |
| Ault-na-gamhnaich | 50 „ | „ „ 1877. |
| Ault-na-leitre | 13 „ | „ „ 1877. |
| Coachan-fearna | 6 „ | „ „ 1877. |

All these are along Loch Lochy, with a northern exposure, at an average height of about 500 feet.

| | | |
|---|---|---|
| Two-mile Belt | 16 acres | Planted, Spring, 1878. |
| Bulloch | 24 „ | „ „ |
| Old Fank | 36 „ | „ „ |
| Gloy Falls | 55 „ | „ „ |
| Ault-na-reith | 10 „ | „ „ |
| Ault-Goibhre | 13 „ | „ „ |
| Coire-Ghrianach | 56 „ | „ Spring, 1879. |

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* A Gold Medal was awarded by the Highland and Agricultural Society of Scotland to Mr. G. Grant Mackay, of Glengloy, for this interesting and most valuable Report, which appears in the last volume of the Society's *Transactions*.

These latter plantations are in Glengloy, with a southern exposure, at an average height of 800 feet.

All the work was done by the slit method of planting by the common spade, and four feet apart was the distance roughly aimed at. The planting was commenced in autumn, 1876, and completed in spring, 1879.

The total number and ages of plants were as follows:—

| | Number. | | Age. |
|---|---|---|---|
| Larch ... ... | 1,765,000 | ... | 1-year seedling (1 and 2 years transplanted). |
| Scots fir ... ... | 1,040,000 | ... | 2-year seedling (1 year transplanted). |
| Spruce ... ... | 350,000 | ... | 2-year seedling (2 years transplanted). |
| Poplar (Black Italian) | 20,000 | ... | About 4 feet high. |
| Hardwood (varieties) | 43,650 | ... | About 2 feet high. |
| Total | 3,218,650 | | |

Being 2,485 plants on an average to an acre.

The total cost was as follows:—

| | £ | s. | d. |
|---|---|---|---|
| Plants ... ... ... ... ... ... | £1,847 | 1 | 9 |
| Freight and Carriage ... ... ... ... | 127 | 4 | 5 |
| Planters' Wages ... ... ... ... | 960 | 7 | 6 |
| Drainage, *nil.* | | | |
| Bridle Paths, about 5 miles ... ... ... | 128 | 6 | 8 |
| Foresters' Wages for three years (proportion)... | 120 | 0 | 0 |
| Cost of Wooden Barracks for Labourers, Furnishings, Spades, &c. ... ... ... ... | 170 | 13 | 10 |
| Cutting Brushwood ... ... ... ... | 25 | 0 | 4 |
| Fencing, 20 miles 922 yards ... ... ... | 1,270 | 13 | 8 |
| Total ... ... | £4,649 | 8 | 2 |

Or about £3 11s. per acre, including about £1 per acre for enclosure.

All the plantations have been enclosed with wire fencing, mostly having six wires (of No. 6 best bright wire) with larch posts and iron angular droppers between. In some cases a larch post and iron dropper were placed alternately; in others, two iron droppers were placed between every larch post. The straining posts are of iron.

The best and cheapest fence is thought to be that with iron strainers —with larch posts at every six yards, and two iron angular droppers between—thus leaving six feet between each post or dropper. The cost (at present prices of iron and labour) is 8d. per yard, which is only half the cost of a fence of iron alone, and really less costly to keep in repair, although that is not the common opinion; about two miles have been erected entirely of iron, having standards at every thirty feet, and four droppers between, with steel wire, all galvanized. This is a neat fence, and suitable in some situations, but nearly double the cost of that already mentioned. The cost was 1s. 2d. per yard. No draining was required, as the whole land is perfectly dry.

All these plantations are growing well and rapidly. Some of those planted three years since are already visible from Loch Lochy, half-a-mile distant. The Scots fir has suffered from black game. It seems strange that in none of the works on forestry that have been published has any reference been made to the injury done to young Scots fir by black game picking out the buds. Every effort will be made for a few years to destroy the black game, until the plants have grown sufficiently to be out of their reach. Wherever young plantations are laid down, rabbits, hares, and black game should, as nearly as possible, be exterminated.

The reporter is persuaded that from every point of view, there is no improvement on an estate at all to be compared with planting. It is at the same time the most beautifying, most beneficial, and most profitable.

It is constantly affirmed, by experienced foresters and planters, that all land worth not more than 10s. per acre of rent should be planted, as being the best investment for money. If this is so, how much more profitable must it be to plant land that is not worth more than 1s. per acre for grazing, of which there are hundreds of thousands of acres throughout the Highlands, admirably suited for the growth of timber. Very frequently land not worth 1s. per acre for grazing is more suitable for planting than land worth 10s. per acre.

It is admitted by everybody conversant with the subject, that land under plantation yields not less than £1 sterling of rent from the date of planting onwards for sixty years. In the case of the plantations now reported upon, the lands yielded 2s. 8½d. per acre average for grazing, and if they now yield 20s., besides the interest of the money expended, the actual return from the land is increased more than sevenfold. This result will be obtained on Glengloy, besides converting it from a bleak, exposed, uninteresting subject into a clothed and sheltered one.

The reporter is so convinced of the profitableness of planting, compared, or rather contrasted with every other species of land improvement, that, apart from the subject of this report, he has planted upwards of twelve millions of trees of all sorts within the last twelve years. One of these plantations, on the estate of Strathkyle, in Eastern Ross, contains about eight and a half millions of plants, and extends in one block to 3,950 acres, being enclosed with a ring fence of wire upwards of twenty miles in length.

If the subject of planting were properly understood, a large proportion of the Highlands should be planted with Scots fir and larch, and abundant employment found for many times the present population, and all wild schemes for cultivating our waste lands might then be laid aside.

In a comparison between the profitableness of planting or reclaiming land for cultivation, the advantage is enormously in favour of planting. The planter, instead of at great expense trenching the land, and removing stones and roots, slits in little plants of a foot in height, and leaves them quietly to take up the valuable ingredients of the soil by their roots, and deposit them, year by year, in leaf on the surface; thereby effectually trenching the soil without any cost whatsoever, besides reaping a highly remunerative crop of timber.

With the limited extent of land in the British Isles, and a superabundance of labour, it is sad to see the vast extent of land still lying waste and unprofitable, simply from want of thought. As to the cost, there seems to be abundance of money to invest in the improvement of every savage country on the face of the earth, but none to develop our own extensive wastes at home.

Choice Trees at Kew.—Remarking lately upon various choice trees in the Arboretum at Kew, the *Gardeners' Chronicle* mentions among others the following as worthy of notice :—*Prunus (Cerasus) Pennsylvanica.*—For ornamental plantations this pretty spring-flowering tree—the wild Red Cherry of the Eastern United States—deserves to be more extensively planted. In the Arboretum at Kew a fine specimen is now one mass of umbels of white blossoms. The smooth, green, lanceolate, sharply-serrated leaves are developed after the flowers have fallen; the colour of the bark is a light reddish brown. In its native habitats it is a tree of twenty feet to thirty feet in height. *Pyrus sinensis.*—In the Kew Arboretum this species is now conspicuous, owing to the warm reddish tints of its large glossy leaves. For foliage effect in spring it certainly deserves to be much more frequently used; it is quite unlike any of the other members of the genus in the large collection at Kew. It was originally introduced from China by the Horticultural Society in 1820, and was figured in *Botanical Register*, vol. xv., t. 1248. The species often met with in gardens under this name is a totally different plant—viz., *P. spectabilis*, also a native of China. It is known by the names Chinese Pear, Snow Pear, and, on account of its hard, gritty fruit, Sand Pear. In the *Gardeners' Chronicle* for October 9th, 1875, p. 457, a figure of the foliage and warted fruits is given from specimens supplied by Messrs. Lee. *Pyrus salicifolia.*—The willow-like foliage of this species is so densely clothed with long, silvery, silky hairs as at the present time to give the trees the appearance—even at a rather short distance—of being covered with white blossoms. This species forms a wonderful contrast to the *Pyrus sinensis*, noted above. In connection with either, Loddiges' remark is certainly worth quoting :—"The contrast of colour is a pleasing point, which, as well as form, should never be lost sight of in the formation of ornamental plantation." It was discovered by Pallas in Siberia, just a century ago. At Kew it forms a small tree, with somewhat pendulous branches, and its beautiful silvery leaves make a strange and striking contrast to the tender green of the foliage of many of its allies. Mr. Lynch sends it us also from Cambridge.

# Prices of Forest Produce.

In accordance with our annual custom, we publish this month a tabulated list of the prices realized by the sale of forest produce during the past season, which is collated from returns courteously furnished by correspondents from each locality mentioned. This table will, doubtless, have a special interest to all our readers who are thus able to observe and compare the prices actually obtained for various kinds of timber, bark, &c., in all parts of the United Kingdom. A glance at the return published by us in the corresponding month of last year will enable anyone to compare the prices realized then and now, and by that means they will be in a position to form a correct estimate as to whether, and in what degree, values have advanced or receded.

In comparing this season's prices with those of last, we may mention that foreign timber, and wood of all kinds, advanced in price about six months ago to the extent of 15 or 20 per cent., and bearing in mind the fact that iron and all other produce went up considerably in value about the same time, it would appear somewhat anomalous if our home-grown timber had not participated in the general rise. It is, perhaps, in pitwood that the home-grown timber comes most directly into competition with the imports from abroad, and the arrivals in this department of the timber trade have been exceedingly heavy during the past six months, more especially from Norway and the southern ports of Sweden; thus the home-producer has experienced a check in getting the higher prices which, in the natural course of things, should have been obtainable The east coasts of England and Scotland are, in a great measure, dependent for their supply of pit props and mining timber upon Norway and the lower ports of Sweden, from which countries hundreds of loads of pit props have been received during the past few months; while the Welsh collieries draw their supplies principally from the fertile regions of France; and every week, as a reference to our contemporary, the *Timber Trades Journal*, will show, a large number of cargoes of pit props arrive at Cardiff, Newport (Mon.), and Swansea, from Bordeaux, Nantes, Havre, and other French ports.

To arrive at a correct appreciation of the prices quoted in our table, it will be necessary to freely consult the remarks appended thereto, in each particular case, which modify and otherwise throw light upon figures which, in some instances, might be a little misleading; and although the information given, as regards the circumstances attending the prices realized, is not always as complete as could be desired, yet there are many useful indications given which assist the reader in forming a proper judgment as to the value of the returns. For instance, it is material to know the distance from the markets and from the nearest railway or shipping port, and the terms of payment is a question that sometimes has to be taken into account Cash payment and a fair price is the desideratum often looked for, and, when obtained, is considered sometimes preferable to a higher figure with a long or indefinite term of credit. Then again, it is a debatable question whether sales by auction or private treaty

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# Enemies to the Tea Plant

By THOS. WILSON, Allynugger, Sylhet, India.

Perhaps it may not be uninteresting to some of the readers of the *Journal of Forestry* to have a few words from one who was, and still considers himself to be, a brother in the profession of Arboriculture, on some of the pests which tea planters have to deal with.

As it is now the time of the year when the tea bush, as well as others, is beginning to throw out young wood, it may be well to deal, first with that insect which gives us most concern at this stage.

(1) The cricket, or *pokha*, as the natives call it, is a very near relation to the grasshopper at home, with this exception, that it measures about two and a half to three inches long, and nearly six inches across rom tip to tip of the wings, and is of a sober brown colour.

This insect works great havoc among the young shoots, which it ds on, cutting them usually under the second or third leaf from the int, and as this is the only part of the bush that yields leaves fit be manufactured, the chagrin of the manager may be imagined when he goes out in the morning and finds bush after bush with many of their shoots thus munched.

The cricket usually commits his depredations in the early morning, and carries his booty off to his home, which exactly resembles a rabbit's burrow in miniature. These may be seen at short intervals here and there among the bushes, more especially among young tea plants.

A curious fact relative to this insect is, that it never goes into its hole to stay without closing the entrance after it.

No remedy is known to prevent their destructive work, except digging them up and killing them. It is the practice on this and other plantations to keep a squad of boys and girls, provided with *koorpees*, or spuds, to hunt for them. When the cricket is about, the burrow can easily be observed from the fact of the mouth of the hole being left open. Great difficulty is sometimes experienced in finding the hole under ground, as it is only about the size of a mouse's, and very tortuous. The writer has known some of them to be over eighteen inches deep, and six to nine feet long.

A boy's task for the day is about sixty crickets, which he has to bring in in the evening to be counted, and for which he receives ten *pice*, equal to about 3¾d.

(2) The next pest to be considered is red spider, *lall bey marru*, or red sickness—the name the coolies give it.

This minute pest is so well known to gardeners at home, that the writer may be excused if he refrains from saying much upon the subject. Red spider most readily attacks bushes growing on a hot sandy soil, where they are exposed to the burning rays of the afternoon sun—that is, on western slopes; also when the bushes have been exhausted by a heavy yield the previous year, or by having their roots cut in any way.

A few words now on the remedies usually adopted.

As the soil in this district, except in *khalls* or hollows which have been silted up, rarely exceeds a depth of one foot, under which is a stiff yellow clay with nourishment in it, the roots naturally spread along near the surface, so it is now the custom on our plantation to do our deep digging with the fork (*kodallie*) instead of the usual flat hoe more generally in use.

This in a great measure prevents the cutting of the roots. When plants are attacked with red spider, the custom is to daub them over with mud, some planters mixing lime and cowdung with it; but we find here that clay without sand in it generally has the desired effect, as it excludes the air from the eggs that have been laid on the surfaces of the leaves, and so prevents them hatching.

I know that some gardeners at home apply most elaborate mixtures to vines, &c., but this would not do here owing to the heavy rainfall which very often washes off in half-an-hour what it has taken days to apply. The mud is put on about the consistency of paint, with brushes made of coarse grass.

The mud business was first thought of, I have heard, from seeing a bush that was badly infected with red spider and which had been spattered over by a buffaloe that had been rolling in a *bheel* or swamp near by, the young wood afterwards coming away clean without any of the pest. The writer has heard of a manager and his assistant once having every leaf stripped off the bushes on five acres, in hopes that it would stop the pest. It did stop the pest, but it stopped the bushes as well, as they did not recover from the effects of this treatment for over three years.

(3) We now come to speak of a pest which, happily, is not so common in this district as it is in Cachar, although it has made its appearance in some places, but not to an alarming extent, I mean the "blight" insect.

This little creature is in size and form closely allied to the mosquito, which is such a troublesome pest to man in tropical countries; or to use a more familiar illustration to some of your readers, it is not unlike the British gnat, or midge. It acts on the young leaves of the tea plant in a manner similar to the mosquito on the human species, puncturing the epidermis, and extracting the chlorophyll. The writer caught three of these insects, and put them in a common test tube along with some leaves that had not been punctured, and in the morning the leaves were black all over, owing to the absence of chlorophyll; meanwhile the insects had undergone a complete change both in size and colour. They were inflated to nearly three times their normal size, and of a green colour instead of black.

The "blight" insect is more common in the vicinity of heavy jungle, or forest, but the writer has heard that it infests some places where the jungle is light. It attacks both the China species and native tea plant with equal virulence. Some planters hold that the "blight" makes its worst attacks where the highest cultivation is carried out, while others maintain the opposite. As I have not had much experience of it yet, I will not venture an opinion on such a knotty subject.

Many persons have tried to find a cure for it; among others, some recommended the passing of a lighted torch under and around the infected bushes, and so by singeing the wings of the insects they fall to the ground, powerless to do more harm. Others say, "try sulphur."

A medical man in Cachar is at present making experiments, and trying to find a remedy for this scourge, the results, however, of his work are not yet known. If he is successful it will, besides securing his own fortune, save many thousand rupees annually in Cachar alone.

On badly blighted plantations, to insure even a fair crop, it is usually the practice to prune early, say about the month of September, instead of waiting till December or January, so as to give the bushes an early start; and thus a good few flushes of leaves can be taken off the plants before the insect makes its appearance in large numbers, which is usually in the month of May or June.

The writer knows of a plantation where the average yield for a season was about 3,000 maunds, equal to 240,000 lbs., but the place was subsequently attacked with "blight," so that only about 1,000 maunds were obtained, or one-third of former average produce, thus involving a heavy loss to the shareholders.

I ought to have stated that "blight," like the cricket, only attacks such leaves as are fit to be rolled into tea.

All the above-mentioned pests do their work only on the foliage of the tea plant, and although that is damage enough, there is one, the "white ant," that is worse than any of them, as it cuts off the bushes bodily.

(4) The white ant is a very insignificant insect to look at, but by reason of its immense numbers the amount of mischief done by its voracity is prodigious.

Readers must not confound this insect with the red or black ants at home. Our friend here more resembles a louse with a long body. This insect lives entirely on wood, and it is surprising how quickly stumps, fallen timber, and sickly trees disappear before it. A piece of wood when it is attacked is usually covered with an incrustation of matter about $\frac{1}{16}$ of an inch in thickness, which some say is the excrement of the insect, but I am rather inclined to believe that it is chiefly composed of earthy matter carried up from the soil to form a covered way, as it contains grains of sand, and feels quite gritty and earthy to the taste.

Plants that have been wounded, however slightly, are more liable to the attacks of the white ant than others, and it shows a preference for the native tea plant, especially for some of the finer varieties of that species, such as the sort called *Lingrhi*. It may be mentioned that in a tea plantation containing close on sixty acres of this variety, we have lost not less than 30 per cent.

As the two species of tea differ considerably in habit and appearance, it may not be amiss to say a very few words about them. The China tea plant always springs from the root with two, three, or more shoots, and there is always a large number of suckers coming away, so that when a bush is eaten across, the damage is not so difficult to repair, from the fact that it will recover itself in three or four weeks' time during the rains—so rapid is the growth of plants in this country. The native tea plant on the other hand is different, as there is but one stem, and when that is cut across, it very rarely shoots out again, as it produces no suckers. Some readers may ask, Why then not plant all with the Chinese kind? This question the writer hopes to answer in a future paper; suffice it now to say, that the indigenous tea is stronger and has a superior flavour to that produced by the Chinese plant.

It has been found necessary to keep a party of youths constantly employed, since the cessation of the rains in October, brushing down soil which had been laid on the bushes, and also cleaning down the white ants that may have lodged under it on the bushes. They have also to clear away any soil that may have been drawn about the necks of the bushes while digging, as this often harbours great hosts of these insects.

Lately we have had iron forks made, with two prongs nine or ten inches in length, and with these we make the women fork all round the stems as deep as possible. This, we are in hopes, will have the effect of at least checking the pests by breaking up the nests which are underground. During the last two months there has been a noticeable decrease in the deaths by white ants among the plants, and this may in a great measure be attributed to the use of the fork. It would, however, be very difficult to break up some of the nests, as will be seen by the following incident:—The writer was about a week ago superintending the lifting of some old tea bushes for transplanting, and as the sun was very strong, great care was being taken to have them lifted with as good balls as possible. One plant was lifted with a ball eighteen inches deep, and directly under that we found a white ant's nest, about nine inches long by six broad, and about the same in thickness, and without exaggeration it contained white ants that might have been reckoned by thousands.

Some experiments are now being made with kerosine oil, resin, and other things, with a view of exterminating and diminishing the ravages of the white ants, but the results are not yet known; when they are I will be glad to communicate them to your readers.

These remarks, which I fear are rather lengthy, must now be drawn to a close; not that the subject is by any means exhausted, but the writer is afraid to intrude further at present on the valuable space of the Journal. I hope, however, that any young forester who may think of coming to India in the tea interest, may not be discouraged by what is here written, but rather be stimulated to try to discover something to prevent or cure one or all of those scourges to the tea plant.

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**Action to Prevent Lopping a Tree.**—An action was lately tried before Mr. Justice Fry, with a view to restrain a committee of residents in Connaught-square, Hyde-park, from topping a tree, opposite the house of the plaintiff, to an unreasonable extent, whereby its beauty was said to be destroyed. It appeared that a committee had been appointed annually since 1853 to look after the garden, to which all the residents had a right, and in seven years they cut down nine trees and a great many small ones. In 1863 they acted similarly, and in 1867 the particular tree in question was, in the opinion of the plaintiff, so lopped and topped as to destroy its beauty. The same thing was repeated in 1873, and in 1878 it was again topped. The question was whether the topping had been excessive, but it appeared that after a time the trees became very attractive. It was the act of 1878 of which the plaintiff complained. After hearing several witnesses, and counsel on both sides, his lordship said that he had not heard anything to lead him to believe that the committee would do anything that would injure the appearance of the garden, which the plaintiff, like the other occupiers, had a perfect right to enjoy. He considered that the plaintiff had failed to make out his case for an injunction, and the action would be dismissed with costs.

# Forest Economy in Sweden.

By AN ENGLISH RESIDENT.

(*Continued from page* 854, *Vol. III.*)

In the Journal for April I gave an outline of the manner in which the Forest Department of Sweden was organized, and now beg to lay before your readers an account of the way in which the living instruments by which the Department works—the real flesh and blood of the organization—are formed. The Head Educational School is the so-called

*Forest Institute at Stockholm.*—This Institute, which has for its object the theoretical and practical instruction of its pupils in all that appertains to Forest Economy, in a wide sense of the words, is under the immediate superintendence of the Forest Department. The officials, consisting of a director, a head master, two assistant masters, and three other teachers, are appointed by the Department in question, and are required to give instruction in the following subjects, viz.:—

Division of Forests—Art of Building as applied to Forestry—Management of Forests—Knowledge of Forest and Game Laws—Forest Technology—Book-keeping and National Economy—Forest Mathematics—Principles of the Knowledge of Climate and Soils—Chemistry—Physics—Forest Botany and Physiology of Plants—Ornithology—Entomology—Hunting and Shooting—Drawing of Forest Plans, &c.

The course of instruction, which is gratuitous, occupies two years, with an appropriate division of the subjects to each year. The year is divided into two terms, the winter term comprising the period from the beginning of October to the end of May, with three weeks' holiday at Christmas. Nearly the whole of this term is passed at the Institute in Stockholm, where a suitable building has been provided by the State, containing class-rooms, rooms where the necessary objects and materials used in the instruction are kept, domiciles for the students, &c. There is also a considerable area of ground near to the Institute, containing nurseries and spaces for experimental planting, as well as a shooting-range, &c. The summer term, which commences on the 1st of June, is nearly entirely passed in practical instruction in forests owned by the Government in different parts of the country, where the students are occupied, under proper supervision, with the personal performance of the tasks which, as foresters, will fall to their lot, and which can only be satisfactorily put into practice by living and working in the woods.

At the end of the two years, a public examination of the students takes place, and it is a *sine quâ non*, before the students receive their certificates as foresters, that they should not only be in possession of the required knowledge in the subjects before referred to, and have passed the period in a satisfactory manner from a moral point of view, but that they should also have worked out without assistance a proper plan for the management of the particular forest district to which they have been apportioned by the principal—a plan not only satisfactory from the economic side of the question, but also from the more important one of the reproduction of the timber after cutting, as well as the clothing of naked spaces with the covering so indispensable to the prosperity of a country with a climate so severe as that of Sweden. The candidate is also required to show the reason why the system of so-called "tract-hugging," or that of "thinning," which he has adopted as the groundwork of his plan of management on particular portions of his district, is more advantageous than the other. Your readers will understand, from this outline of the examination, that it is a severe test, and one calculated to produce skilful foresters.

In point of fact, the system followed has been found efficient, and I cannot close this branch of the subject without expressing my opinion that it would be difficult to find a finer body of men than the corps of foresters (Jägmästare) of Sweden. Not only are they true gentlemen, as a rule, but unite in no common degree a theoretical and practical knowledge of their profession. Hardened by the nature of their calling, which requires a nearly continuous activity in the open air of a hard climate, they possess a rare physique added to a sure hand and eye which make them the best of companions on a hunting expedition. From the ranks of these men, which are the kernel of the whole system, the inspectors of the nine forest districts into which the country is divided are chosen.

The principal conditions which the candidates for admission to the Forest Institute are required to fulfil, are—

1. Must be between eighteen and twenty-eight years of age.
2. Pass strict medical examination.
3. Have passed an equal examination to that insisted on by the high public schools of the country for entrance to the universities.
4. That satisfactory affidavits as to moral character are given.
5. Must have either passed through a Nursery School for trees

and plants (of which more anon) or for the space of at least one year have had practical experience of the management and measurement of forests, with a forester picked out for that purpose by the Forest Department. A detailed statement of the work accomplished in this capacity, as well as an attest from the forester referred to that the candidate can without assistance make a sketch of a piece of ground from the map of a land surveyor.

For the purpose of instructing the so-called watchers of the forests (who serve under the immediate orders of the forester) in the A, B, C, of the science of Forestry, as well as for the purpose of giving preparatory instruction to the candidates for admission to the Forest Institute, six Schools or Nurseries have been opened by the Forest Department in different parts of the country. In addition to these six schools two private institutes receive direct assistance from the State for principally devoting themselves to the teaching of the science.

These schools are situated beside or in forest ground belonging to the State, and proper buildings have been erected by the Government, not only in the shape of class-rooms, but also dwellings for the teaching staff and the pupils. The schools are under the immediate supervision of the Inspector of Forests for the district, who is present at the examination of the pupils at the close of the term. The term extends from the 1st of October to the 15th of June following, and the instruction comprises—

1. The three R's, in the more developed sense of the words.
2. Measuring of ground, map drawing, and calculation of the contents of square and solid figures.
3. Knowledge of the trees indigenous to Sweden, and the quality of soil each requires, &c., &c.
4. Knowledge of the animals, birds, &c., useful in promoting the growth of timber, as well as of those that damage plantations. Likewise of the birds and animals which are most useful in the chase.
5. Knowledge of the groundwork of Forestry sufficient to enable the pupil to understand the plans for forest management issued by the Department, as well as the economically most advantageous method of using up timber.
6. The preparation of charcoal and potash.
7. Book-keeping as applied to Forestry.
8. Practice in shooting and in the hunting of wild animals.

These are the principal subjects taught, but there are a large number of details connected with the subject which cannot be so easily specified, but which will readily occur to the practical portion of your readers.

Having now given some idea of the groundwork of the forest organization, I shall take an early opportunity of noticing some of the results of its work which have come under my observation.

*(To be continued.)*

# DESTRUCTION OF TREES AT BLAIR-DRUMMOND, PERTHSHIRE.

AMONG other interesting incidents given by the *Perthshire Constitutional*, of the effects of the fearful storm that swept over the central parts of Scotland on the 28th of December, is the following:—"A few particulars of the damage occasioned in the picturesque policies of Blair-Drummond on the night of the Tay Bridge disaster may be quoted by way of illustration of the great havoc committed in Scotch woodlands. The force of the gale may be imagined from the dimensions here given of some of the trees blown down. In Blair-Drummond Park some fine specimens among the ornamental trees fell a prey to the storm. Some of the largest of the silver firs, larches, and poplars were overthrown; as also some of the Scotch firs and beeches, although these were not the largest of their kind in the park. A note of the dimensions and probable age of some of those that have been levelled is given below. The girth is taken 30 to 40 inches above the ground, free of the swell of the roots:—

| | Girth. | | Height | Probable |
|---|---|---|---|---|
| | ft. | in. | in feet. | age in years. |
| Silver fir on top of Sandhill ... | 11 | 6 | 104 | 100 |
| Do. on sloping bank below do. ... | 10 | 0 | 108 | 100 |
| Do. on Doune approach near well... | 12 | 1 | 116 | 100 |
| Do. do. cross roads ... | 11 | 3 | 81 | 100 |
| Do. do. ... ... | 10 | 0 | 85 | 100 |
| Do. do. Merlin's Ford | 12 | 0 | 104 | 110 |
| Scotch fir in park ... ... ... | 9 | 0 | 80 | 100 |
| Do. on Doune approach cross roads | 7 | 11 | 80 | 90 |
| Larch west of house ... ... | 12 | 0 | 90 | 100 |
| Do. near front door ... ... | 9 | 2 | 118 | 146 |
| Beech near entrance-gate of house | 12 | 0 | 104 | 160 |
| Do. in park ... ... ... | 11 | 9 | 100 | 160 |
| Poplar near Bridge of Haugh ... | 12 | 4 | 106 | 90 |

There are still many large trees standing at Blair-Drummond, the girths of which, measured in the same way, are given below: Oaks, 16 ft., 15 ft., 13 ft. 5 in., 13 ft. 3 in., and 12 ft. 6 in.; Spanish chestnuts, 10 ft. 8 in., 9 ft. 5 in.; silver firs, 15 ft. 6 in. and 14 ft. 2 in.; beeches, 17 ft. 7 in., 16 ft. 8 in., 16 ft. 1 in., 16 ft., and 15 ft. 4 in.; planes (sycamore), 17 ft. 10 in., and 13 ft. 6 in.; elms, 14 ft. 2 in.; Scotch firs, 11 ft. 9 in., 10 ft. 5 in., 10 ft., and 14 ft. 2 in.; poplars, 13 ft. 8 in. and 12 ft. 10 in.; walnut, at Burnbank, 13 ft. 5 in.; ash, at Burnbank, 14 ft. 2 in. and 13 ft. 6 in.; limes, 13 ft. 10 in. and 13 ft. 4 in."

# Comparative Scarcity of the Yew as a Hedge Plant and as Underwood in Scotland.

BY D. T. FISH, HARDWICKE, BURY-ST.-EDMUNDS.

MOST travellers must have noticed the decline of the yew as a hedge plant, or a factor in the formation of useful underwood, as he journeys northwards. It can hardly be on account of the climate, for the yew is among the very hardiest of our native trees. Neither can it be the soil, for no country, county, or district, can be said to have a monopoly of either good or bad soil. No doubt, however, the yew likes a good soil. It forms many and vigorous roots, and grows pobably faster than almost any other bush or tree where it finds a deepish root-run with something good in it. Nevertheless, it may also often be found thriving fairly well on rather poor soils. Its beauty and usefulness all lovers of trees well-nigh agree in praising. As a hedge plant it affords abundant shelter, whilst its dark leaves and impenetrable network of branchlets coralled over with its innumerable brilliant acorn-like berries, afford a combination of sombreness and brilliance hardly matched by any other plant. There seems a sort of superstition about the yew being a slow grower. Place it in favourable conditions, and few plants can beat it. Of course starved yews may be met with whose growth is hardly perceptible. The same is true of most trees; the oaks of Dartmoor, in Devon, for example, where it is said a hundred oaks may be found a hundred feet high—that is, a foot each. And many of those tiny bushes are hoary with age. But give the oak the soil and site it desiderates, and mark and admire how it towers up to claim rank as the monarch of the forest. And though the yew is less tall and sturdy, and also less useful than the oak, it also forms splendid undergrowth as well as hedges, and also runs up into very respectable trees. The wood is among the hardest of our native timber, and could it be grown in quantity and of sufficient size, it would doubtless soon be in brisk demand. It also forms capital fuel in all states and sizes, giving out as much or more heat than any other wood.

Perhaps some of our northern foresters will tell us why it is not more grown in the north, or whether it would not be well on utilitarian as well as artistic grounds to plant more yews. Is the yew neglected because the grand old Scotch Pine is so popular? Of course in pine woods there is hardly any place for the yew, whereas in the more mixed and more decidedly deciduous plantations in England, the yew affords a pleasing contrast and a useful shelter in winter.

# The Eucalypts of Australia.

BY ANDREW TAYLOR, ASSIST.-SEC., BOTANICAL SOCIETY, EDINBURGH.

THE fifth decade of Baron Von Mueller's magnificent atlas, "EUCALYPTOGRAPHIA," begun in 1879, and exhaustively treating the numerous species of this wide-spread tree of Australasia, both in their scientific and technological aspects, has just reached this country. It is specially interesting because of its dealing in monographic detail with the two giants of this wide-spread genus of the *Myrtaceæ.*

The *Eucalyptus amygdalina,* the "Giant Eucalypt" or "Wangara," is perhaps the tallest of trees; it is amongst the foremost of quick-growing hardwood trees, at the same time yielding a volatile oil from its foliage, whose varied properties are even now not fully recognised. The systematic name is unhappy, as in no way does it bear a resemblance to the almond tree. It flourishes chiefly in the humid southern and eastern districts of Victoria, extending to the Blue Mountains in New South Wales, ascending to about 4,000 feet in elevation. It does not stretch into Western Australia, though frequent in Tasmania. Its most favourable habitat is where neither subject to severe frosts nor intense moist heat. It varies according to geological situation. Thus in the irrigated ravines of the cooler ranges this tree sends up its straight white stem to a towering height. If *E. coccifera* is an Alpine variety, it has braved even unusually cold winters in Britain. Thus, at Powderham Castle, the seat of the Earl of Devon, it passed unscathed through an ordeal of + 9° Fahr., while *E. globulus* was destroyed at + 20° Fahr. The tree at this castle grows on sandy loam on rising ground; it is 58 feet high; the stem measuring 7½ feet in circumference at 3½ feet from the ground. The low temperature quoted caused no injury; and in the summer following it had thousands of blossom sprays.

It seems almost invidious to raise the question if the Sequoia and other mammoth trees of California be higher than *E. amygdalina.* Both are beautiful in their place and season. The Australian tree is perhaps the king of the forest, but then it shows its superiority in disproportionate fashion, shooting up like young Australian "corn stalks"—all height, but with no corresponding umbrageous body.

The *E. amygdalina* often terminates in a solitary forked branch pushing singly to the sky. Mueller gives the tree an approximate height of 400 feet. In one fallen tree measuring 420 feet, the length of the stem to the first branch was 295 feet; the diameter of the stem at the commencement of the ramification was 4 feet; at 70 feet higher the diameter was still 3 feet. Another tree at 3 feet from the ground was 53 feet in circumference. The Rev. Thomas Ewing measured a prostrate tree showing a height of 220 feet up to the first branch; the top was broken off at 64 feet above this; the basal diameter was 30 feet; the stem diameter at 220 feet was still 12 feet, so to that distance this single tree would yield more timber than three of the largest oaks taken together with their branches. And within a square mile were at least a hundred trees, none less than 40 feet in circumference at the base. Mr. G. Robinson noticed in the back ranges of Berwick, the circumference of a stem to be at least 81 feet at a distance of 8 feet from the ground. The same gentleman, a surveyor, obtained at the foot of Mount Baw-Baw an exceptionally large tree 471 feet high. At the Cape Otway ranges a tree was noted 415 feet high, with a basal diameter of 15 feet, although the loftiest trees have not always colossal stems.

The timber of this tree does not twist, and is useful for many kinds of carpenters' work. It has been introduced in naval construction. It has failed in mining works, but yields an excellent fuel. A labourer has in some instances split 620 palings of 5 feet length from a stem in a day. The leaves of this Eucalypt yield a merchantable oil—so much as 500 ounces being obtained from 1,000 lbs. of leaves. It dissolves gutta-percha readily, and may be burned as petroleum is in lamps, though with a distinctive odour; it is of great therapeutic value, and has been introduced in the manufacture of varnishes. Mr. Bosisto, J.P., Western Gippsland, has established a factory for its manufacture, where 6 tons of leaves are operated on daily, and 12,000 lbs. of oil are annually produced. The wholesale price of the oil is, in England, 3s. per gallon.

This species stands foremost as the health tree for malarial or fever regions. Prince Pierre Troubetz Koy has recently confirmed Von Mueller's judgment in regard to this, at Lago Maggiore. There the *E. amygdulina* grew 60 feet in nine years, and endured a temperature as low as 18° Fahr., proving hardier than *E. globulus* and *E. rostrata.*

The *E. diversicolor*, or the "Karri," shares with the *E. amygdalina* the epithet of "one of the greatest trees of the globe, and one of the greatest wonders in the whole creation of plants!" Its special home is Western Australia. Messrs. Nairn saw trees with stems about 300 feet long up to the first branch; and Mueller has noted many trees approaching 400 feet high. When closely growing the young trees have a comparatively slender trunk, so much so, that a tree 180 feet high may show a stem hardly a foot in diameter. But on the other hand a basal diameter of 12 to 35 feet is met with. It is as hardy as *E. globulus*, though it may prove less so than *E. amygdalina.* It is naturalised in the Mediterranean region, going there by the name of *E. colossea.*

In poor sandy soil near Melbourne it has grown about 23 feet in nine years. On the entrance of the La Plata river it is said to increase two or even five inches daily in the most favourable part of the season.

THE HORSE CHESTNUT IN GREECE.—In Sibthorp's *Flora Græca* it is stated, on the authority of Dr. Hawkins, that the Horse Chestnut grew on Mounts Pindus and Pelion, but until quite recently it was doubted whether this tree was really wild, or, rather, indigenous in South-eastern Europe. At the Botanical Congress of Florence Professor Orphanides expressed his belief that it was a native of some parts of Greece, but he was unable to give exact localities. According to a letter from Dr. Heldreich, the director of the Botanic Garden at Athens, to Dr. Bolle, which appears in the *Monatsschrift der Vereines zur Beforderung des Gartenbaues,* &c., the Horse Chestnut is undoubtedly wild in the mountains of Northern Greece, Thessaly, and Epirus. He himself has seen groups of trees in various localities in the mountains of Eurytania. In the course of his travels last summer he discovered the Horse Chestnut in five different localities, all of them in the lower pine region, at altitudes of 3,000 to 4,000 feet above the sea. It occurs in shady forest ravines, associated with alder, walnut, plane, ash, various oaks, holly, hop hornbeam, *acer platanoides*, and *abies apollinis.—Gardeners' Chronicle.*

A FOSSIL FOREST.—On the slopes of Amethyst Mountain, 2,000 feet to 3,000 feet above the river valley, in the Yellowstone Park, are exposed at different levels, at interviews through the entire height, a series of silicified trees, many rooted in the position in which they grew, and from twenty feet to thirty feet in height. Some lying down are of great size, the fragments measuring eighty-two feet in diameter, and comparable to the giant Sequoias. The series of sandstones and conglomerates in which the trees are embedded are more than 5,000 feet thick, forming a vertical mile of fossil forests, the woody structure well preserved; but where cavities have been formed in the trunks of the rotting wood, they are lined with crystals of amethysts and quartz.—*American Gardeners' Monthly.*

ACER CIRCINATUM.—In the Arboretum at Kew one of the most striking of low trees or shrubs at the present moment is the subject of this note—the Vine Maple of Oregon and Washington Territory. Its umbels of deep red flowers and the large bracts, deeply suffused with red, beyond which the roundish-cordate, seven to nine-lobed serrulated leaves are just beginning to unfold, contrast wonderfully with the soft light green of the young foliage. In the shrubbery, particularly where the species has a back-ground of dark green, it is in the early spring a very effective plant. In its native habitats, according to Dr. George Vasey's *Catalogue of the Forest Trees of the United States,* it "has a low and frequently reclining or prostrate trunk, which sends forth branches, at first upright, then bending down to the ground, and forming almost impenetrable thickets."—*Gardeners' Chronicle.*

[*Correspondents sending letters signed with initials or fictitious names are requested to enclose their name and address, as otherwise their communications cannot be inserted.*]

## ESTATE MANAGEMENT AND CATCH CROPS.

SIR,—The best possible reply I can make to Mr. King's request that I give your readers my experience of estate book-keeping, will be conveyed in his own words. Under my superintendence the accounts of a large estate are very simply kept, to the entire satisfaction of the proprietor, "without fussiness, pretentiousness, or pompousness," if the latter word can convey any possible meaning when applied to book-keeping; and if I ventured to obtrude upon the readers of the *Journal of Forestry* my method of keeping those accounts, I certainly should consider that I deserved to be set down as "perfectly unfit for estate management." To make another quotation—"book-keeping must be fact-stating and not figure-fumbling." But I leave the more experienced readers of the Journal, who are in any way acquainted with farm practice, to judge under which head the entry of the produce of 11 acres off 5½ acres of land must be set down.

In these days of reduced rents, small profits from home farms, and large discounts to tenants, landowners require more than at any former period the services of practical men in every department. And if the estate accounts are simply but accurately kept, and a good balance upon the right side can be shown as the result of the year's farming, I presume the proprietor will not be over-fastidious as to the particular system of book-keeping adopted upon his estate. In applying for the management of an estate I should as soon think of enclosing a photo, representing the exact cut of my coat, the build of my hat, the style of my riding-boots, and the mount of my whip, as I should of alluding to, or in any way parading, my system of book-keeping.

Among your young forester readers, many probably already are, and others eventually will be, entrusted with a share of estate management, which will include farming. And when I see such advice given as interlining a crop of potatoes with cabbage, and credit taken for obtaining the yield of 11 acres off 5½ acres, I repeat my assertion that the statement is fallacious and misleading. Catch crops there undoubtedly are in abundance, which in favourable seasons may be cultivated with advantage, but the above is not one of them. Field crops of potatoes generally require clean cultivation up to a late period, and, in these times of rampant disease, all the sun they can afterwards obtain to mature them. Interline cabbages sufficiently early to give these a decided start before the potatoes are ripened and raised, and you very seriously interfere both with the maturing and the lifting of the latter, while the former are very little, if any better than they would be when planted from the seed-bed into a well-ploughed and thoroughly pulverised piece of land, from which the potatoes had been dug.

If such advice is the result of the "experience and mature judgment" to be obtained from thirty years' farming, I feel thankful that my career as a farmer stops a little short of this.

Mr. King's assertion that "swedes after mown rye is *not* a catch crop," must surely be intended for a joke, and a very poor one it is. My catch crop was rye, and an abundant one it was, and cut and carried off most carefully, as the land was too wet for either feeding or carting off. The remarks about "working in ridges," "back-bouting," using "drag-harrows," &c., look feasible upon paper, but they are utterly at variance with the experience of the working of such land in such a season as 1879. A light steam-plough and steam-harrowing with no treading from horses, was the only *likely* means of obtaining a good tilth either for swedes or for any other root-crop, and even this failed from the closeness and wetness of the land.

The statement respecting the simplicity of the accounts kept by a "working-manager" who had been substituted for the "agent," which accounts, amongst other things, showed the number and *condition* of the implements, particulars of timber *standing* as well as cut, and a number of other items equally remarkable, and all within the capacity of a boy too young to be emancipated from the board-school, who could devote one hour per day to the work, has aroused my curiosity. And unless specimen pages of his accounts are forthcoming I may in a future number venture to ask a few questions about these and the utility of the box of "samples of cereals." During a somewhat lengthy farming career (not quite thirty years), and selling between 1,000 and 2,000 quarters of corn annually, besides buying largely, I *never* knew a dispute arise which necessitated the production of the "duplicate sample."

RUSTICULUS.

## PINUS SYLVESTRIS AND ANCIENT FORESTS OF THE SOUTH OF SCOTLAND.

SIR,—Referring to the remarks of W. W. R., on page 24 of the present volume of your Journal, there is, so he says, no doubt that *Pinus sylvestris* at one period existed over a wide area in the South of Scotland, but I very much doubt whether such has been the case within historic time, or say, since the foundation of Edinburgh in the 7th century?

The country immediately to the south of Edinburgh, was, at the beginning of the 16th century a forest, and we learn from the Town Council Register that, under a grant made by James IV., in 1508, the citizens cut down "a vast number of large trees, whereby the quantity of wood in their hands became so great that they could not dispose of it." This timber, it would appear from Drummond's "History of James IV.," was oak. To encourage the inhabitants to purchase the said wood, the Council decreed that whoever should buy a sufficient quantity to re-front his house, should be allowed to extend the new front seven feet into the street, whereby the streets were greatly reduced in breadth, and "the buildings which before had stonern fronts were converted into wood, and the burgh into a wooden city." In 1544 the English burnt the greater part of this wooden city; and in 1554 it is recorded, timber was so scarce in Edinburgh that, by the Council's order, wood required for public works was taken by force from holders who refused to sell it—an obligation to return like quantity being given. The local supply thus failing, imports were made from North Europe (Norway and Dantzic); and in the "Golden Charter" granted by James VI. to the city in 1603, may be seen the harbour-money paid to the Leith authorities upon boards, deals, single and double roof-spars, joists, &c.

It is highly probable that any old and existing roofs made of Scotch fir are of this imported timber. It is noteworthy that in 1677 an Act of the Town Council was passed, decreeing that all houses should be built of stone and covered with slates or tiles, so many serious fires having occurred by reason of the wooden and thatched buildings then in vogue.

I shall esteem it a favour if W. W. R. will state his authority fo rsupposing the roof of Holyrood Palace, placed in the building at its restoration for the use of the Duke of York, just over two hundred years ago, was of Scotch fir "obtained somewhere in the neighbourhood."

F. M. Webb.

*Edinburgh, May* 15*th*, 1880.

## THE DETERIORATION OF SCOTCH FIR.

Sir,—You were kind enough to give mine on this subject a place in the March issue of your Journal, and on page 772 I said to the effect, that if it could be proven that continental seed, under the treatment best suited for it, can produce plants as hardy as those from native seed, and that could accommodate themselves as readily to all our soils and exposures, it would be a great gain, both to landed proprietors and nurserymen, seeing that when home seed is scarce, or not to be had at all, as appears to be the case this year, it might be got at a cheap rate, thereby enabling proprietors to make steady progress with their planting, and nurserymen to offer a continuous supply of good plants, and that at a cheap rate. Your correspondent, W. W. R., on pages 24 and 25 of your May issue, gives us the benefits of his experience and opinions on this subject. He says he "would reject it for no other reason than the percentage of deaths which occur among the plants produced by it in the nursery, if the season is wet.

I could buy it at Hamburg at a tremendous reduction compared with our own seed." From this are we to understand that this is the weakest of the many strong reasons he has for rejecting it, and that the deaths in his seed-beds were as tremendously great as the price was little, compared with our own? If the experience of nurserymen and others, who must pay large sums for those large quantities, coincided with those of your correspondent, they could not afford to buy seed, however cheap, that would produce fewer plants for the money than the much more expensive native seed would do. He further says: "A great amount of this seed is imported every year; it is a regular trade," and if so, the demand must be greatly in excess of the supply, to induce so great an import, or else that import would naturally cease. I ask what stronger facts could W. W. R. wish, to prove that his experience in his two-acre nursery must weigh but little when placed in the balance against that of those who created this "regular trade," because they are all men of experience, who make the growing of trees from seed a speciality, and many of them are men of much culture.

Perhaps some one of the large importers of this seed will be kind enough to tell us how far their experience and that of W. W. R. agree.

We found our continental and home seed thrive last year equally well; they were all sown in the same well-drained and exposed plot, but not so our common spruce. We had a plot, the higher part of which was dry, light soil, but this part gradually sloped off to a cold, wet, heavy nature of soil. In this plot we sowed our spruce, all the same sort, from the same sack, and the same day, and they all briarded equally well, but after all the support the seed could afford them was gone, those growing in the damp parts gradually died off, until in the end of last autumn we had only about twenty good sound plants for every hundred we had on the higher and drier parts.

W. W. R. says: "The continental Scotch fir does not succeed, either, at a high altitude; indeed, I think in its native habitat it does not reach to anything like the same high range as our own." With regard to this, will he be so kind as to give facts for your readers to handle and look at, or the authorities which led him so to think? If he turns to page 767 of your March issue, he will find me state, on the authority of Professor Selby, that its geographical distribution is very extensive, being found in Europe from the Mediterranean in the south to latitudes as high as 70° in the north, and from Spain and Britain in the west to Siberia in the east. In the southern parts of Europe the zone it occupies extends in some countries to upwards of 4,000 feet, while in the colder regions of Lapland, &c., it reaches to 700 feet above the sea level. By the aid of those factors, I think W. W. R. will find that the height to which they may be expected to grow, along with native firs in this country, will be about 1,500 feet above the sea level. If my deductions are correct, perhaps he will say how much higher than this does he find our own grow, and where?

Your correspondent makes very interesting statements regarding the durability of native Scotch fir, but, unfortunately, gives us no idea of the age to which they grow, or the proportion of red or heart-wood to sapwood. I believe the majority, at least, of intelligent people practically engaged, either in the growing or the manufacturing of the best quality of native and Baltic Scotch fir timber, agree in saying that the one is about as durable, and can be as profitably worked up, as the other; and that young, soft, wide, and coarse-grained timber, from either side of the German Ocean, are about equally perishable.

Will your correspondent be so kind as to say where the trees are growing of twenty and thirty years of age that "could be distinguished this winter at a considerable distance, growing along with the native pine, with the seed of which it had been mixed, by its brownish tinge and straggling head?" If the two different kinds are growing in groups, with some idea of the nature of the soil, and subsoil? How does he know the foreign and native seeds, from which those trees grew, were mixed before sowing in their seed-beds, thirty years ago; and in whose nursery did they grow? Did he see the seeds mixed, or was he only told about them? May I be allowed to conjecture that the straggling head he speaks of must be due to some local causes, because Mr. Grigor, in his "Arboriculture," says:—"The upward growth of foreign Scotch fir, in good shelter and a favourable climate, is more rapid than than of the native plant. This is very decided in early life, but their girth is generally less, and at best the tree assumes the tall, slender appearance which I have observed conspicuously in the *planted pine woods of Germany*, even where the trees had ample space."

No doubt there is such a thing in forest nosology as "larch disease," but I fail to see what that has got to do with Scotch fir, more than horse nosology has to do with that of cattle; as it is doubtful if the difference between those two kinds of trees is less than between these two kinds of animals. We observed in your March issue that Scotch fir is indigenous to countries in Europe, both north and south of our latitude; whereas *Larix Europæa* had only been introduced to Scotland about 1725, and is not known growing, naturally, north of the Tyrol mountains. I fail to see that larch disease is clearly traceable to the effects of climate upon this foreign plant, more than in its own native Tyrol mountains. *Adelgis laricis*, or *Coccus laricis*, the "larch bug," was first observed by Mr. Sang upon the larch at Raith, in Fifeshire, about 1785, and in 1795 the Duke of Athole's attention was directed to it, in consequence of its prevalence in his extensive plantations. It is probable, however, that it was introduced with the original plant, although it remained unnoticed. Many other trees have their health-destroying "bugs," but they are all quite different to the "larch bug," and this is in favour of the conclusion that it is not an insect indigenous to this country; nor am I aware that it has yet been unquestionably shown that it is unknown in the continental natural forests of larch.

*Dunrobin, Sutherlandshire.* D. McCorquodale,
*Forester.*

## GERMAN SEED OF PINUS SYLVESTRIS *versus* NATIVE SCOTCH SEED.

SIR,—Mr. Robert Service, of Maxwelltown, Dumfries, writing to me in connection with certain statements in my chapter on Damage to Forests, in my "Capercaillie in Scotland" (chap. xxiv., p. 131), says as follows:—

"On account of the sometimes high price of native seed, the nurserymen [in the S.W. of Scotland.—J.A.H.B.] almost always buy their seed from Germany. This is a fact which a nurseryman, owing to the prejudice against foreign seed, will scarcely acknowledge. The produce of this German seed is very easily distinguished from that of the native-grown seed, by its *quicker, stronger growth;* and all the lower needles turn brown in winter—in nursery rows, at all events. I do not know if the distinction of colour holds good in the case of full-grown trees. The plants in summer are never so bright a green as natives; the native strain always remains green. The statement of Mr. Hancock ('The Capercaillie in Scotland,' p. 141) is quite absurd, as is also the supposition that Scots firs are raised from 'slips' (*op. cit.*, p. 142). No coniferous trees for extensive planting are raised in this manner; the cost of so propagating them would be at least twelve times as much as raising them from seed. But your own supposition (p. 143), so far as I can judge, is very nearly correct; although I do not at all agree with you that the foreign strain is *inferior*, as it produces wood much quicker than native."

[Does not this fact point towards a softer, less hardy, and less durable wood, than the slower-growing native?—J.A.H.B.]

"It is certain that the foreigners are much more liable to attack by *Hylurgus piniperda.* That beetle is fearfully destructive here; whole breaks of German seedlings are often rendered useless, and the comparative immunity enjoyed by native seedlings often points out an additional distinction.

"The beetle seems to confine its operations to boring a few inches of the pith of the growth of the previous season, the leading shoot and the strongest laterals being the parts attacked. These are broken off and hang by the bark after a strong wind, and the whole break, when badly infested, has the appearance of having been mown. Only those plants which have a good leading shoot are saleable, and often more than two-thirds of the plants in a large area are useless, and the whole lot has generally been burned. *Three years transplanted is the size most liable to attack.* Last year—1878—it was very bad in our own and neighbouring nurseries, and this year it is scarcely noticeable—probably a result of the cold and wet season, as in warm summers it seems the beetles are most numerous.

"I have never been in woods frequented by Capercaillies, but it seems to me the damage done to the Scots firs must be the results of the boring of the *H. piniperda,* and I believe the insect would do most permanent damage to a plantation of natives, owing to the *slower growth* and *denser* and more *branchy* habit of the true native fir. The persistence with which the strongest lateral shoot assumes the position of leader is very remarkable in the foreign variety, and I believe it has by far the strongest constitution. If the beetle could be kept off the young trees, the plants from German seed would certainly be the preferable.

"I have not the slightest doubt that if there are such strains of Scots firs in existence as Sir Robert Menzies and Mr. Hancock describe, they have been produced from native seed imperfectly ripened in our uncertain climate. Certainly, I have never seen, in hundreds of acres of seedling Scots firs (German) in various nurseries, any tendency to assume the forms described. Any tendency of this sort has invariably been with the native seedlings."

J. A. Harvie Brown.

*Dunipace House, Larbert, N.B.*

## DRAINAGE AND ITS EFFECTS.

Sir,—In looking over the *Journal* for May, I was much pleased with the article by Mr. J. W. Barry, on "a substitute for pitting in planting," which is, no doubt, not only a novel but a practical means of having the work done. What makes the method more remarkable is that it bears a close resemblance to some suggestions in regard to drainage and its effects, which I forwarded to an agricultural journal some thirteen years ago. As "a good story is none the worse for being twice told," perhaps you may may find a place for the article referred to, which is as follows:—

It is well known that drainage is the first step towards good farming, and in a great many cases it is imagined that after land is drained it needs no more attention in that respect; but I am under the impression that such is a mistake, for drainage, like a great many of man's inventions, only produces effects for a limited length of time.

Everyone acquainted with farming is aware that land lying in pasture for a length of time after being drained naturally tends—more or less, according to the nature of the soil—to assume the natural or original appearance which it had previous to being drained; and in order to counteract such effects, it is often found necessary to plough up such land, and put it under a rotation of crops. One would naturally inquire, What is the cause of drainage losing its effects, though the tiles may be as clear as when put in? The cause is self-evident. The newly-cut drain affords a large surface for drawing off the water, the pipe or tile laid in the bottom of the drain being only a conductor for carrying off the water after being drawn from the surface soil, and the soil dug up in forming the drain, through length of time, becomes consolidated, and gradually ceases to produce effect. Then the plough is had recourse to, in order to counteract, the difficulty.

The fact is, that ploughing is nothing but a species of superficial drainage, and the deeper the ploughing the greater the effects; the superfluous water and cold damp being drawn farther from the surface.

Then, deep ploughing being so much advantage in drawing off the superfluous water, and also exposing the soil to the action of the atmosphere, I am inclined to think that a regular digging or trenching should be given to the drain to within a few inches of the tile, at the same time the land is ploughed up, which would produce nearly the same effects as a newly-cut drain; for there is no doubt that the land is more indebted to the newly-cut drain than to the tile that is laid in the bottom of it, and the more so the more retentive the soil may be.

Another thing I would remark, that there is generally too little attention paid to the size of the tiles put in, it being generally thought that if the tiles are large enough to contain the water they may have to carry off, that it is all that is required; but a little attention will show that the tile should perform something more. It should also act as a conductor for drawing the water from the upper soil; consequently the more retentive the soil may be, the larger the tiles should be, in order to afford a larger surface for that purpose.

No wonder that drains put into a clay or retentive soil lose their effect after being a few years in the ground. The soil becoming gradually consolidated, the effects that a small pipe-tile will produce three or four feet from the surface, must necessarily be very limited.

Not having seen the plan of digging over the drain adopted, nor yet having had opportunity to experiment on its effects, if you think the above worth a corner in your valuable paper, perhaps it may meet the eye of some one practically acquainted and better able to use the pen on such matters

*Bute Estate, Rothesay, 12th May,* 1880.

James Kay

## PERMANENT PASTURE.

Sir,—In the last number of the *Journal of Forestry*, Mr. Burrows speaks about exceptional cases adduced by me in my letter on the above subject. I do not admit them to be exceptional. Such cases are to be found wherever agriculturists trust to carbon in a gaseous form to enrich their pastures. The statement in "Science for Young Foresters" conveys no other meaning than that carbonic acid gas enriches the soil in vegetable matters, year after year, independent of any other help.

I do not deny that carbonic acid gas is necessary to the growth of plants, but Mr. Burrows does not trust its enriching effects on his pasture. In his letter he recommends manuring in various ways. I know to my cost that manure is necessary to maintain the pastures in a fertile state. My cottage and gardens are surrounded by permanent pastures, soil a heavy black loam resting on brown calcareous clay, and it has been found necessary to apply manure to keep them in proper condition.

My remarks upon exhaustion are not confined to siliceous soils, but apply to all soils without exception. Does Mr. Burrows mean that siliceous will not be benefited by carbonic acid gas as well as other soils? and if not, *why* not? The extract from Professor Johnson which says: "*Some grass lands* will retain the good condition they thus slowly acquire for a very long period without manuring," &c. Hundreds if not thousands of acres of grass lands in the highlands of Scotland have yielded good crops of hay from time immemorial without being manured by man, but that is no proof that they are not well manured. The droppings of the sheep and other stock are washed down the mountain sides into the valleys, and in the lowlands in the vicinity of mountain streams the grass lands are often flooded during winter, and in both cases excellent crops of hay are reaped both in quantity and quality.

The rich corn lands and grass lands of England and Ireland may be in the same position as the Scotch valleys, in mountain districts they will be, and likewise where irrigated by floods; but should any owner of grass lands expect the carbonic acid gas of the atmosphere to enrich his pastures, he will reap disappointment.

Professor Johnson says: "Every crop takes away from the soil a certain quantity of those substances which all plants require. If you are always taking out of a purse, it will at last become empty. The farmer takes his money out of the land in the form of crops; and if he is always taking out and putting nothing in, it must at last become empty or exhausted. If he puts in the proper substances in the proper quantities and at the proper times, he may keep up the fertility of his land perhaps for ever."

Agriculture must have been at a very low ebb when corn lands were cropped for a hundred years without manure. There must have been a nice balance in the soil of the proper substances necessary for the production of the hundred crops. It would have been instructive if a register had been kept of the weight of each year's crop.

ANDREW SLATER.

*Rose Cottage, Loftus in Cleveland, May* 13, 1880.

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## TREE-PLANTING BY THE RIGHT HON. W. E. GLADSTONE AT DALMENY, EDINBURGH.

SIR,—It may be interesting to your readers to have a short account of the planting of a line of sycamores at Dalmeny Park, by the Right Hon. W. E. Gladstone, on the 1st December, 1879. At that time we had severe frost, the ground in the home nursery being frozen so hard that the surface had to be broken up with a pick-axe, and to such a depth that the upper rootlets were torn off the plants with the frozen earth before the spades could be applied—altogether very unfavourable weather for planting. However, the plants, being large, and growing upon heavy soil, lifted with excellent balls, well matted with roots; and they appear to have suffered but little, although necessarily exposed for a time to such a severe frost, as the whole number are now in full leaf, and have quite a healthy and vigorous appearance. I give, in detail, the dimensions of each, as measured before growth commenced:—

No. 1. 7 ft. 6 in. high and 3⅛ in. circumference at 10 in. from the ground.
" 2. 7 " 6 " " $3\frac{3}{16}$ " " " "
" 3. 7 " 5 " " 3⅝ " " " "
" 4. 7 " 2 " " 3⅜ " " " "
" 5. 7 " 2½ " " $3\frac{7}{16}$ " " " "
" 6. 8 " 4 " " 3½ " " " "

The Earl of Rosebery selected the place where they were to be planted, on a fine old grassy lawn, along the side of the carriage-drive, near to the mansion, and sheltered by some grand old sycamore and ash trees from the cutting north and east winds, which occasionally sweep up the Firth of Forth with great force. Half-an-hour before the time appointed for the planting, the plants were lifted and the holes made ready for them. The holes were dug out about three feet in diameter, to the depth of fully two feet. The soil being a rich, sandy loam, with a pure sand subsoil, the loam was well broken up (the turf being saved to lay down again), and put into the bottom of the holes, reserving a sufficient quantity to be put above the roots. Punctual to time, Mr. Gladstone appeared, accompanied by the Countess of Rosebery, and began his work in a thoroughly practical manner, by seeing that every plant was properly set in its place, all the roots spread out at a right depth, and the tree standing straight, before he filled in the soil. He handled the spade with the greatest freedom, and in an active manner, which few at his age could be expected to do. The tree-guards which we have adopted for their protection are of the continuous bar style, 3 ft. 9 in. in height, two lengths forming a circle, 9 ft. 8 in. in diameter, consisting of five horizontal bars; top one ronnd, ¾ in. in diameter, and the others flat, 1 in. by ¼ in. thick; 12 standards, 1⅛ in. by ⅝ in., in each circle; joint standards, 1¾ in. by ⅝ in. thick, with double-pronged feet 15 in. long. This makes a most substantial tree-guard, and looks well. Within this circle is a second guard of wire netting, which protects the plants from the inroads of hares and rabbits. This inner guard is 3 ft. high and 3 ft. in diameter, fixed to the ground with iron pins passed down through the meshes from about six inches from the top, which keep it firm in its position. I consider this to be a better system than covering the outside guard with the netting, as it cannot be destroyed by cattle or sheep. The care bestowed by Mr. Gladstone in planting the trees was such that every practical forester would appreciate and admire; and the success which has rewarded his labour, by the trees having fully developed into leaf, goes to prove the appropriateness of his remark while planting, that he "always liked to finish his job."

*Dalmeny Park, Edinburgh, May 21st,* 1880. JOHN ALLAN, *Forester.*

## ENGLAND.

The completion of the delivery or stacking of bark, according as it may be sold at once or stacked at home, and the clearance of timber, cordwood, and faggots from the falls, should be the first work of the month. With us the stripping season has been a lingering one on account of the cold easterly winds; but the bark itself was never finished off in better condition for the tanner, though the current prices of from £4 5s. to £4 10s. per ton are not what ought to be obtained in a season like this.

In the woodlands little can now be done beyond cleaning young plantations, removing brushwood and other rubbish, and lightening the heads of weak-stemmed tillers. The painting of gates and fences may be proceeded with. Rub off all rust from iron before painting. Where the cheap and useful black varnish is used, a dry and hot day should be selected for its application.

Repair the wood roads as soon as carting is finished, take up brushwood from temporary clearance roads, stop all gaps, and entirely shut up the woods as soon as possible. Where there are hedges of furze or privet these may now receive a switching, and elder screens may be cropped before the end of the month. The bottoms of hedges should also be kept quite free from weeds throughout the summer.

Seedlings will no longer need covering up, but the beds should be kept well hand-weeded and watered when required. Exotics may, however, be covered up when the nights are very cold. When the weather is dull and showery small evergreens may be pricked out and afterwards watered and shaded. The bandages of grafts may be loosened and the clay renewed where required. Variegated hollies may also be budded.

Elm seed may be collected at the end of the month. Gather such from tall, well-grown trees, and handle and store it up with care. As it heats quickly, it should either be sown at once or spread out to dry. For raising two-year seedlings it should not be very thickly sown. A covering of half-an-inch of light, mellow soil will be sufficient. Good elm seeds have a very firm capsule.

Open out large trees intended for removal next year, and afterwards dig trenches round them at distances proportioned to the spread of their branches. Afterwards refill the trenches with good, mellow soil and mulch and fork round the trees. A growth of abundance of fibrous roots may be expected to follow.

Where forest trees are pruned the work may be commenced at the end of June. The healing is more rapid at this season of the year than at any other. I have already quoted the high authority of Dr. Brown on this point. He says :—"After the 1st of August the motion of the sap becomes slower and the wounds are consequently longer in healing up. My impression therefore is that the month of June is to be preferred to any other month in the year for this operation."

When large transplants become wind-waved, fill up the spaces around the stem with fresh soil and well tread this in. Upon seedling beds the same process may be to some extent adopted, except that the treading is impracticable. But here some very fine soil sifted over the beds will insinuate itself around the stems and fix them most effectually. Mulching transplants will be found the best treatment during a dry June.

Where oaks are rising from sown or dibbled acorns these should be kept free from briars and rank weed growths.

Among the work preparatory to next autumn's planting may be mentioned the paring and burning of mossy land, draining, fencing, and road-making. Pitting upon heavy lands cannot be performed too early in the summer.

Young plants of a deciduous kind in the nurseries may now be trimmed up or side pruned. But the common practice of depriving these of all their side branches can only be productive of tall and weakly trees, quite unfitted to go out in situations of great exposure. A moderate pruning is to be recommended.

*Pluckley, Kent.* A. J. Burrows.

## SCOTLAND.

The chief work of the month will be the stripping of bark. It will look much more saleable and take the market better if well cleaned of all lichens and moss with the bark-scraper. Where there is a command of open shedding the bark should be put under cover as it gets ready. It can then be chipped on wet days, and if it has far to travel, and has to be transferred from one conveyance to another, it is much more handy when chipped to put it in bags.

It would be advisable to look over all recently-planted ground, and have the trees cleared of all grass or undergrowth. If there is any appearance of the fir weevil (which is almost sure to be the case if a crop of Scots fir has occupied the ground previously), wash the stems with some strong-smelling liquid, or throw gas lime round the roots of the young trees, which may mitigate the damage to some extent.

Keep the hoe going in the nursery; never allow the weeds to get established in the ground. Look to recently-grafted trees and see that the clay is adhering.

W. W. R.

## WALES.

In most cases the stripping of oak bark will now have been completed, and generally secured in first-class condition. If the dryness of last month has been against the farmers' crops, it has been very favourable for the bark harvest. Where bark has been sold it should be delivered at the earliest opportunity during dry and favourable weather. Have the timber dressed and removed from the plantations as early as possible; and where there is demand the branches should be corded, or disposed of for firewood, &c.

Hardwood trees should now be looked over and pruned where necessary, and fir or coniferous ones disbudded, which will be all that is necessary if looked to in time.

Clear all recently planted trees of rough herbage, ferns, brambles, &c., so that they may not be smothered or drawn up, but have plenty of room, light, and air.

Dig, hoe, and clean young hedges, as occasion requires; if such work is neglected, they are sure to get bare at the bottom.

Continue fencing as last month, and paint and varnish all iron and wire fencing, rubbing off all rust and blisters previous to painting, which should be done well down under the ground.

Evergreen trees and shrubs may be successfully removed and transplanted with good balls of earth, but it will be necessary to have them liberally watered and syringed all over the foliage.

Keep the hoes going in the nursery during dry and hot weather, and clean drives, walks, &c.

*Kinmel Park.* LEWIS BAYNE.

## IRELAND.

Those who did not embrace an early start at oak-peeling found it very difficult to remove the bark after the middle of last month. During the severe frost vegetation received a great check, and the bark harvest had in some instances to be curtailed, but the fine dry weather which continued during the past month has admitted the bark being ricked in fine condition. As far as yet ascertained the price of oak bark will range rather low this season. In plantations where peeling has been carried on, collect all the spray into heaps or have it removed altogether, so as to clear the ground for the young growth to come up.

Towards the end of the month look over your plantations and see that ferns, &c., do not interfere with the growth of the small trees. This is an important item for the forester to guard against.

Besides the usual routine of repairing roads and fences, this is a good time to begin operations for protecting river-sides. Such work should always be done as early in the season as possible, so that embankments, bulwarks or such like undertakings may be consolidated before the customary floods usual in autumn. Everything in the way of water-work ought to be done during the summer months.

*Ballinacourte.* D. SYM SCOTT.

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CURRANT BUSHES ON RAILWAY BANKS.—In the last number of the *Flore de Serres* M. Putzeys makes a practical suggestion as to the utilization of these waste spaces, and after enumerating various shrubs whose use is more or less general, he goes on to recommend the culture of the common Currant *(Groseiller commun)*. Its roots would bind the soil well, its foliage would prevent the drying of the soil, its propagation is easy, and its fruit is commercially valuable. We strongly commend the notion to the authorities. Raspberries, strawberries, and many other plants might be grown in similar fashion, and would require little attention, the primary object being the maintenance of the banks, not the quality of the fruit.

CATALOGUS PLANTARUM.—At a recent meeting of the Scientific Committee of the Royal Horticultural Society, the *Gardeners' Chronicle* says :—"Dr. Masters showed a copy of a folio work under this title, drawn up by a society of gardeners in 1730, including Philip Miller, Thomas Fairchild, and other notable garden botanists of the day. The work is illustrated by twenty-one coloured plates, from the pencil of the famous flower-painter, Van Huysum. The purport of the book was to furnish an illustrated and descriptive 'catalogue of trees and shrubs, both exotic and domestic, which are hardy enough to bear the cold of our climate in the open air.' Only one part was issued, apparently under the editorship of Philip Miller. The book is mentioned in Johnson's *History of Gardening*, but is not catalogued in Pritzel, though the beauty and fidelity of the illustrations are such as to warrant it being noted in any catalogue of botanical literature.

MONSTER LARCH TREE.—There has just been sent from the estate of Glenlyon, in Perthshire, a cut of a monster larch, for the proprietor, Colonel Garden Campbell, of Troup. It was taken to the photographic studio of Messrs. A. Rae and Son, Banff, to be photographed before being made into a couple of tables. The tree from which the cut was taken measured no less than thirteen feet in circumference, four feet three inches in diameter, and five feet at the widest points. The wood is very clean.—*Perthshire Constitutional.*

# THE HOME FARM.

## OPERATIONS FOR JUNE.

*The Flock.*—Wash and shear sheep, allowing an interval of 8 or 10 days between the operations, so that the yolk may rise into the wool, thereby improving its quality and increasing the weight. From 3s. to 3s. 6d. per score, according to the size of the sheep, with beer, or beer-money, is about the usual rate of payment. Dip lambs a few days after shearing the ewes. Push forward barrens and wether tegs with a little cake or corn daily.

*The Turnip Crop.*—This will be the season for getting in the main crops in the midland and southern counties. Swedes come first, next hybrid kinds, then the yellow and white-fleshed varieties. During a dry season plough the land intended for such crops as little as possible, but clean and obtain a good tilth by a free use of scarifier, harrows, and roller, in order to retain the moisture in the soil. Heavy lands may be baulked up, but the lighter soils are better worked and drilled upon the flat. Where farmyard manure has already been ploughed in, keep the artificials near the surface to stimulate early and rapid growth. Roots of any kind to be carried off the land should have from 25 to 30 loads of dung per acre; those for folding may be grown with about 5 cwt. of dissolved bones or superphosphate, or an equivalent of some other genuine artificial manure. Shoddy is valuable on account of its action upon the crops in the later stages of their growth. Use lime upon land subject to the disease called "finger-and-toe," "or anbury."

*Mangolds* will now require horse-hoeing, bunching, or setting out, and singling. From 12 to 16 inches between the plants will afford space for large roots and heavy crops. Use the brake freely, as the taproots descend rapidly and give the plants a firm hold in the soil.

*Swedes* may still be planted, and in early districts where they are subject to mildew, the beginning of June is the best season.

*Kohl Rabi* for the main crop, *rape* for soiling or ploughing in green to clean and enrich the land, and *tares* for a last sowing, may now be got in.

*Cleaning Crops.*—All corn crops should receive their final hoeing and cleaning. Beans, if slack, may be top-dressed with 2 cwt. of gypsum and 1 cwt. of common salt per acre. Lucerne should be horse-hoed and hand-weeded, carrots and parsnips cleaned and singled. If the larger sorts, such as the white Belgian, are drilled from 12 to 15 inches apart, give them 6 inches between the roots. Potatoes should be well stirred between the rows, and the earlier sorts will require moulding up by the end of the month.

*Thousand-head and Cabbage* for autumn and early winter feeding may now be planted out, and such as were drilled in May will require cultivation.

*Hops* must be kept well tied to the poles, and all superfluous bines should now be drawn from the hills. Keep the *shims* or nidgets constantly going in dry weather to destroy weeds and pulverize the soil. Careful driving and turning are indispensable in hop-gardens. Remove large poles from weak hills, and substitute smaller ones. Towards the end of the month ladder-tying must be resorted to in forward gardens. No operation better repays the outlay. When the crop is heavy and the bine sloughs or slips down the pole, producing what is called "housiness," the sun is excluded and the hops ripen imperfectly. The hills should now be dug or rounded with the spud, and such stimulating manures applied as are considered necessary. From 5 cwt. to 10 cwt of rapedust per acre will be found very effective. As the season advances such manures as nitrate of soda, kainit, and guano, should be but sparingly applied. In gardens subject to mould apply with the sulphurator from ½ cwt. to 1 cwt. of sulphur per acre, when it will adhere to the leaves. Creosote and bed up poles for next season.

*Farm Stock.*—Horses may be put upon a shorter allowance of corn now that green food is abundant. Brood mares should be turned out to grass, and served again by the end of the month. Yearling colts may be castrated as their old coats fall off, and strong two-year-olds may be carefully handled and put to light work during part of the day. Pigs kept in yards may be fed upon tares, rye, clover, lucerne, or other green crops, with a daily allowance of corn or brewer's grains and middlings, or pollard. Wurzel will now be found highly nutritious for pigs, and the manure will be both enriched and consolidated by their running over it. Cattle will be entirely dependent upon the pastures; but in wet weather or where the herbage is very succulent, a few pounds of cotton cake per day will be found useful. Sheep may be folded upon tares, clover, or other soiling crops.

*Haymaking* will require close attention when once commenced. Mow successively trifolium, Italian grass and mixed seeds, trefoil, sainfoin, red clovers, and meadow grasses. The broad-leaved kinds should be turned about as little as possible in order to preserve the leaf entire. These should, as much as possible, be finished off in cocks. Modern haymaking consists of little beyond machine-mowing and tedding, horseraking, and carrying. But far superior hay is made by a little extra attention. Spread out each day such grass as was mown early in the morning and in a wet state, allowing the remainder to stop in the swathe until the second day. With the ordinary hay weather of the end of June, what has remained one day in the swathe and been tedded next morning may be broken into small wind-rows soon after noon, and gathered in small grass-cocks in the evening. These are shaken out into double or larger wind-rows the next day and gathered into larger cocks at night. Another shaking out during the day and gathering into still larger cocks at night, and the hay will be fit for carrying on the fifth day at the latest, and in much better condition as fodder than such as has been fully exposed during the whole time. When the weather has been unsettled and the hay has become washed, sprinkle from 10 to 12 lbs. of salt per ton with the fodder while stacking.

*Dairy.*—For the regular supply of the mansion the calving should be continuous. The cows should have good shelter and water during the heat of the day. Stall-feeding at this time and turning out at night have been found successful. Frequent change of pasture and clean milking are essentials in dairy management.

*Poultry.*—Keep young turkeys shut up in wet weather. Allow goslings and young ducks an extended range. Keep fatting poultry in the dark except at feeding times. Buckwheat, either boiled or steamed, is a forcing food.

*Estate Work.*—Deliver bark, and remove timber, cordwood, and faggots; cart gravel, sand, lime, fencing materials, and bricks, tiles, &c., where such are not burnt upon the estate. Horse and hand-hoe buckwheat, where grown for game.

B.

THREAD MANUFACTURED FROM WOOD.—The manufacture of thread for crochet and sewing purposes has recently been started at the Aby Cotton Mill, near the town of Norkoping, in the middle of Sweden. The manufacture has arrived at such a state of perfection that it can produce at a much lower price thread of as fine quality as "Clark's," and has from this circumstance been called thread "*à la* Clark." It is wound in balls by machinery, either by hand or steam, which, with the labelling, takes one minute twelve seconds, and the balls are packed up in cardboard boxes, generally ten in a box. Plenty of orders from all parts of Sweden have already come in, but as the works are not yet in proper order there has hardly been time to complete them all. The production gives fair promise of success, and it is expected to be very important for home consumption.—*Timber Trades Journal.*

[*The Editor desires to call attention to several questions in recent numbers, which remain unanswered, and hopes that practical readers will assist in maintaining the usefulness of this department.*]

## QUESTIONS.

53. **Gorse-cutting Machine.** — Can any one recommend me a machine which will cut up gorse for fodder quickly and well ?—H. L. M., Retford, Notts.

54. I have been advised to erect works on an estate for supplying tiles and bricks, and should be glad of some practical hints. Can you, or any of your contributors, assist me ?—Major Louth, Essex.

55. In this part of the country we have lost many beautiful specimens of the *Cryptomeria Japonica* this spring. They seemed to have got through the winter frosts very well, and at the end of March compared favourably with many of their neighbours; but since then they have gradually drooped, and are now perfectly brown, and as dead as doornails. I should like to know if this has been the case in other parts.—R. H. W., Weybridge, Surrey.

## ANSWER.

49. **Growing Rhododendrons in Hollow Stumps of Trees.**—Rhododendrons can be grown with perfect success in the hollow stumps of trees. The stumps should be placed about 12 inches in the ground, and 24 inches out of it. Break up the soil underneath, and add two-thirds of peat to one-third of loam. The peat and loam must be chopped very fine, and well mixed together before being applied. The Chillingford clay, where it is at hand, will answer as well as anything. Allow plenty of water when planting, and don't expose the plants when newly planted to cutting winds. The stumps should be as large as possible, say from 18 to 24 inches in diameter of cavity. Any of the hardy sorts of rhododendrons will do perfectly well.—J. W.

56. **Holly Leaves Injured.**—I send you by post a few holly leaves in a box, as a sample of the way in which the hollies are being attacked, more or less severely, in this neighbourhood. Will you or some of your correspondents kindly give me the name of the insect that is doing the injury ?

G. P., *Wortley, Sheffield.*

[Your holly leaves are injured by the larvæ of a small fly (*Phytomyza ilicis* of Curtis) which often attacks the leaves of the holly in spring in vast numbers. We know of no remedy except picking off the leaves and burning them. The insect appears to be rather more numerous than usual this season.—Ed.]

# REMARKABLE TREES IN PERTHSHIRE.

At the April meeting of the Perthshire Society of Natural Science, held on April 15th, Mr. Magnus Jackson read an interesting paper on the above subject. Our report is taken from the *Perthshire Constitutional.* Mr. Jackson said that trees, thoroughly to be understood, must be looked at from many points—the general contour, balance or symmetry, foliage, bark, &c.; but his intention was only to point out where some remarkable specimens of trees could be seen. The first one he would bring under their notice was the Pepperwell Oak near Methven Castle, so called from a well of that name near it. It was also called the Wallace Oak—not that it existed in the days of Wallace, but, he had no doubt, some one seeing such a noble tree, thought it worthy of the name of Wallace. It was 80 ft. in height, had a spread of branches of 90 ft., and at 1 foot from the ground was 23 ft. in circumference, and at 5 ft., 19 ft. 6 in.—the narrowest part of the bole or main stem. He had not calculated the cubic contents of the tree, but it contained a very large amount of timber, and was altogether one of the finest specimens of the oak in Perthshire. Among numerous large and magnificent trees on the Methven Castle estate were some rare and beautiful specimens in the Keilour Pinetum, planted upwards of 40 years ago by Mr. Bishop, gardener at Methven Castle. Noteworthy was a very fine specimen of *Pinus nobilis*, or the Noble Pine—a species discovered by Douglas in California. Its beautiful foliage and cones (which were about 8 inches in length) entitled it to its name. There was also a *P. Monticola*—one of the loveliest trees to be seen. When in its prime, the foliage was so luxuriant and rich that the *Monticola* was something like a large flower. Next this tree was a group of black American pines with very dark green foliage, and an immense number of cones, covered nearly all over with a snowy-like substance. At The Cairnies there was a very large collection of the most recently-introduced specimens of the fir. There is a Prince Albert fir—one of the first, if not the first, planted in Britain. In 1864 a photograph of that tree was sent to Her Majesty, and she expressed so great admiration of it that it was offered to her and graciously accepted; and it was then that it got its name. It was raised from seed sent home by the Collector of the Oregon Association. Beauty and elegance, combined with usefulness, were its characteristics. At Glenalmond there was a golden spruce about 80 ft. in height. It was the only plant of its kind, and so symmetrical that it looked a pyramid of gold in the midst of the surrounding green foliage. A remarkably fine beech, and a group of elder trees very large and of great age, are to be seen at Glen Tulchan. At Monzie are some celebrated larches. Although not quite so tall as the Dunkeld larches, they were much more picturesque. The finest *Pinus cembra* in Britain, standing about 80 ft. high, and clothed to the ground with a very luxuriant foliage, was to be seen at Cultoquhey. At Inchbrakie, two miles distant, is to be seen "Montrose's Yew," said to have sheltered the celebrated Marquis when being pursued by his enemies. Among some extraordinary specimens at Lawers, the most noticeable were:—A lime tree girthing at 1 ft. from the ground 21 ft., and at 2 ft., 15 ft. 10 in.—the spread of branches was 90 ft., and the height of the tree 60 ft.; a sycamore, girthing at 1 ft. from the ground 26 ft., at 5 ft., 18 ft. 7 in.—spread of branches 66 ft., and height of tree 35 ft.; an ash, measuring in circumference at 3 ft. from the ground 22 ft. 8 in., and at 5 ft., 16 ft. 4 in., the height being 70 ft. On the Moncreiffe Estate were a large number of very fine old trees:—A magnificent specimen of the horse chestnut, girthing about 18 ft. at the narrowest part of the bole; several fine old ash trees, girthing 14 ft. and 16 ft. at 3 ft. from the ground, and about 90 ft. high; a willow, the largest and most beautiful about Perth; a *Picea Nordmanniana*, about 4ft. high, and almost perfect in form; several fine old walnuts; and a cedar of Lebanon, one of the largest and most perfect in Perthshire. At Kilgraston there was a Spanish chestnut said to have been planted by Cromwell, but Mr. Jackson thought that Cromwell had other things to do than to plant trees; and even had he done so, he was not so much admired in Scotland at the time but that the people would have torn it up. However, it was a grand tree, and vigorous and healthy, girthing at 1 ft. from the ground 10 ft. 8 in., and at 5 ft., 12 ft. 5 in., the spread of branches being 55 ft., and the height of the tree 45 ft. A rather picturesque old Spanish chestnut was to be seen at Dunbarney, girthing 20 ft. at 1 ft. from the ground, and 16 ft. at 5 ft.; spread of branches 55 ft., and height of tree 32 ft. At Freeland was one of the finest beeches in Perthshire. At 1 ft. from the ground its circumference is 18 ft., and at 5 ft., 15 ft.; the height of the trunk being 90 ft., and the spread of branches 111 ft. There was also a Scots fir, which, at 3 ft. from the ground, was 11 ft. 6 in. At 8 ft. from the ground the tree divided into two large stems, each of which would form a large tree 60 ft. in height. There was also a silver fir, which had a clean straight stem of 60 ft., and a height of 90 ft. At 3 ft. from the ground the circumference was 13 ft. 5 in., and at 5 ft., 12 ft. 1 in. Some fine specimens of elm, elder, beech, and wide-spreading American oak were also to be seen on this estate. Dupplin Estate had the honour of rearing the best araucaria in Scotland, if not in Britain. There was also a very fine cryptomeria; specimens of walnut, beech, and silver firs were magnificent; whilst larch and Scotch fir were well represented. At Gask were to be seen specimens of the finest Spanish chestnut trees in the country. On Strathallan Estate grew a fine group of Spanish chestnut trees. One of the group was 70 ft. in height, and measured 17 ft. 6 in. in circumference 1 ft from the ground. "Malloch's Oak," supposed to be a remnant of the ancient forest which once covered this part of the country, was a very remarkable tree. It was about 16 ft. in circumference, and the branches have a great spread. It is supposed to be about 600 years old, and served as a gallows for a man who was hanged by the rebels in 1745. There was also growing here a specimen of the *Picea pinsapo*, which had attained the height of 40 ft., and was undoubtedly one of the most thriving of its kind in this country. At Keir was to be seen one of the finest and healthiest specimens of a Spanish chestnut to be seen in Strathallan. At 5 ft. from the ground it attained the circumference of 21 ft. On Blair Drummond Estates were to be seen some good beeches. Two, which grew at the back of the new house, were about 100 ft. high, and measured 17 ft. 6 in. in girth 3 ft. from the ground. They had splendid boles of 20 ft. In Duncrub Park garden a fine specimen of the *Abies Douglasii* was to be seen. It was raised by seed sent home by Douglas. At Dunning was a curious old thorn tree, which was planted in 1715 to commemorate the burning of Dunning by the Highlanders. On the Scone Estate, at the roadside, near Quarrymill, is a fine specimen of the weeping beech considered the best of its kind in Scotland. The seed of that tree was self-sown, and the trunk has now attained a height of upwards of 40 ft. Near the precincts of Scone Palace was "Queen Mary's tree." It was a sycamore tree, and was planted by Queen Mary. It was 63 ft. in height, and had attained a circumference of 14 ft. There was also another sycamore tree, which was planted by King James VI. It had a girth of 12 ft. at 4 ft. from the ground, and had reached a height of 80 ft. There was also a fine specimen of an oak, planted by King James VI., measuring 15 ft. in girth 1 ft. from the ground; an *Abies Douglasii*, 75 ft. high; an elm 95 ft. high; and an oak, planted in 1808, with a clean stem of 40 ft., and a total height of 70 ft. There were likewise some fine specimens of ash trees, about 250 years old. In Scone Wood there was a Scots fir, known by the name of "The King of the Forest," which measured in circumference 1 ft. from the ground 17 ft. 8 in.; at 3 ft., 15 ft. 8 in.; and at 5 ft., 15 ft. 2 in., with a total height of 75 ft. At Lynedoch there was a silver fir 110 ft. high, with a girth of 13 ft. 10 in. at 3 ft. from the ground, and 45 ft. of a spread of branches. It was estimated to contain 400 cubic feet of timber. Two fine specimens of *Abies Douglasii* were planted in 1834, and had attained a height of 90 ft., and a spread of branches of 75 ft. At Luncarty there was an ash which was 100 ft. in height. At one foot from the ground it measured 13 ft. 5 in.; at 3 ft., 11 ft. 4 in.; and at 5 ft., 10 ft. 1 in., with a clean bole of 22 ft. At Seggieden there were a good many fine old trees, notably an oak of large dimensions. Its height was 70 ft., and its spread of branches 90 ft. At one foot from the ground it measured 16 ft. in circumference; at 3 ft., 13 ft.; at 5 ft., 12 ft. 1 in.; at 20 ft., 11 ft. 6 in.; and at 22 ft., 11 ft. 8 in., with a clean straight bole of 28 ft. At Fingask a large number of fine trees were standing, including a *Picea Cephalonica*, 55 ft. high; a *Wellingtonia*, planted 20 years ago, which had attained a height of 60 ft., and a girth of 10 ft. 6 in. at 1 ft. from the ground. There were also some fine *Araucarias*. At Balthayock was to be seen a very curious old elm, 25 ft. high, 8 ft. in circumference, and knarled all over. It had evidently been broken at some time. There was also a characteristic specimen of the Scots fir 70 ft. high, with a splendid stem and fine head. Dunkeld district was famous for fine trees. Near Birnam, close to the river Tay, were two fine trees—an oak and a sycamore. The oak had attained a height of 50 ft., with a spread of branches of 40 ft. At the narrowest part of the bole it measured 19 ft. 7in. The sycamore tree was of large dimensions; at 3 ft. from the ground it girthed 23 ft. There were also some fine beech and larch trees at Birnam and Dunkeld. There was an oak at Dunkeld which girthed, 5 ft. from the ground, 12 ft. 6 in., had a clean straight bole of 30 ft., and a total height of 100 ft. At the north-east corner of Dunkeld Cathedral stood a fine large elm, which, it was said, was planted upwards of 200 years ago. Tradition affirmed that a Highlander, when on a visit from the Western Highlands to the family of Athole at Dunkeld, took the sprig of elm out of his bonnet and planted it. At the King's Park was a ponderous oak, girthing at 4 ft., the narrowest part of the bole, 15 ft. 2 in. It had some enormous limbs, and a spread of branches of 99 ft. On the opposite side of the river stood "Neil Gow's Oak," a superior tree to that one, and underneath whose spreading boughs the famous violinist doubtless played many an inspiriting tune. In the park between the Cathedral and the kitchen garden was a magnificent specimen of the horse chestnut, with long, hanging boughs touching the ground. It was 80 ft. in height, and had a spread of branches of 75 ft. In the kitchen garden was a fine old elm, 95 ft. in height. At the entrance gate were several Spanish chestnut trees, and near the new house was what was considered the finest larch tree in Scotland. It rose to a height of 120 ft., and at 5 ft. from the ground its circumference was 11 ft. 2 in., and at the foot 13 ft. 10 in. In the Den at Blair-Athole was a large spruce tree, 140 ft. high, and of corresponding girth. There were also to be found there fine specimens of sycamore, Scots fir, and larch. About two miles east of Dunkeld was to be seen a beautiful weeping elm, which had attained a height of 70 ft., and had long, dropping branches nearly touching the ground. That tree was one of the most graceful and perfect specimens in Britain. An ash which was probably upwards of 300 years old, and an excellent specimen of the oak, were to be seen at Kincairney.

Mr. Jackson said time would not permit him to go any further, and he had not nearly exhausted the subject, but he would be very glad to resume it at some other time.

On the motion of the Chairman, seconded by Dr. Buchanan F. White, a hearty vote of thanks was awarded Mr. Jackson for his excellent paper.

*Journal of the Royal Agricultural Society of England.* Second Series. Vol. XVI., Part I. London: John Murray.

The interesting statistics relating to agricultural matters which occurred during 1879, occupy, as usual, the leading place in this valuable Journal. The first article which follows is a full and particularly interesting report by the judges appointed by the Society to adjudicate the prizes in the Sewage Farm competition, 1879. Two prizes, each of £100, were offered by the Mansion House Committee, in connection with the London exhibition of the Society, for the best-managed sewage farms in England and Wales. The farms were arranged in two classes: those in Class I. utilizing the sewage of not more than 20,000 people, and those in Class II. utilizing the sewage of more than 20,000 people—one prize being offered for each class. In Class I. the sewage farms at Aldershot, Bedford, Gainsborough, and Wrexham competed; equal merit being awarded to the sewage farms of Bedford and Wrexham. The prize in Class II. was awarded to the Earl of Warwick for the Leamington sewage farm; Mr. R. S. Brundell, in connection with the Doncaster sewage farm, being awarded a second prize for an admirable example of thrifty management, and showing how sewage can be applied to general farming. The sewage farm of Birmingham, managed by Mr. James Anscombe, was highly commended. The other sewage farms competing in this class were those at Croydon and Reading.

"Market Gardening and Vine Culture in the North-West of France," forms the subject of a very interesting account by H. M. Jenkins, F.G.S., Secretary of the Society, of the methods followed, in that part of France, in the cultivation of vegetables for the market, and grapes for the manufacture of wines and brandy. When farmers are being advised to turn their attention more to the cultivation of fruits and vegetables for the supply of our markets, in these times of bad seasons, foreign competition, and fading fortunes, they may profit considerably by a perusal of Mr. Jenkins' excellent paper, after which they will probably decide to stick to farming and avoid market gardening as equally uncertain and much more laborious.

A capital paper, on the important subject of "The Supply of Milk to Labourers," by Henry Evershed, goes exhaustively into the question, and quotes evidence of undoubted authority to prove that a full supply of good milk is one of the most important factors in rearing, and maintaining in robust health, a vigorous and able-bodied working man. The scarcity of milk throughout the country appears to be general, and it is proposed to remedy this by the multiplication of small dairies, which, if they became common, would certainly prove a great advantage to the community.

"Underwood: the Planting, Growth, Conversion, and Sale thereof," by Francis Tallant, of Eastbourne, will be read by foresters with much appreciation. The poorer soils of Sussex have been long celebrated for their production of underwood or coppice, and the various methods followed in the planting, culture, manufacture of produce, and its sale, are all detailed in a most interesting manner. The "first shoot" of various kinds of trees grown in Sussex copses attained the following remarkable heights in 1878: Ash, 8 ft. to 10 ft.; alder, 7 ft. 2 in.; birch, 7 ft. to 8 ft. 7 in.; Spanish chestnut, 7 ft. to 8 ft. 6 in.; hazel, 6 ft. 3 in.; willow, 8 ft 6 in. to 11 ft., but in the notoriously wet season of 1879, the first shoot rarely reached 24 in. in height, and many of them not 12 in. As an illustration of the profitable nature of a thriving coppice, an instance is given by Mr. Tallant, of a 9 acre plantation of Spanish chestnut, which was made in 1835, on the Cowdray estate of the Earl of Egmont. It was headed down in 1840, after which it produced growth which was sold by auction in 1849, 1858, 1868, and 1876, realizing in all £99 per acre, or at the rate of £2 15s. per acre per annum, during the 36 years. As this underwood was reckoned of superior quality, Mr. Tallant wisely warns foresters against taking these figures as representing the general average of planted coppice.

Principal Simonds, of the Royal Veterinary College, and Consulting Veterinary Surgeon to the Society, has a valuable "Abstract Report on Rot in Sheep," which will be found useful to the flockmaster.

"Reports on the Field and Feeding Experiments conducted at Woburn on behalf of the Royal Agricultural Society, during the year 1879;" "An Experiment on the comparative value of Linseed-cake and a mixture of decorticated Cotton-cake and Maize-meal for fattening Bullocks;" "On the comparative value of Soluble and Insoluble Phosphates;" and "On the composition of Cream and Skim-milk," by Dr. Augustus Voelcker, F.R.S., Consulting Chemist to the Society, are invaluable essays to the practical agriculturist. The past Agricultural Year, our Climate and Wheat Crops, and various interesting official reports, make up an excellent part which is ably edited by Mr. Jenkins, the indefatigable secretary of the Society, who is to be congratulated on his success in placing such a useful and well-written volume in the hands of the members.

*The Cobham Journals.* By E. A. ORMEROD, F.M.S. London: Edward Stanford, Charing Cross.

THESE interesting Journals consist of five quarto volumes and some unbound papers, in the possession of the Meteorological Society, and contain a valuable collection of meteorological and phenological observations, recorded by Miss Caroline Molesworth at Cobham, Surrey, for the long period of forty-four years. A carefully-compiled summary of these voluminous observations is now presented to the public by Miss Ormerod, in the useful and interesting volume before us, which will be perused with delight by all who take an interest in our varying seasons and changeable climate. An instructive introduction by Miss Ormerod furnishes the reader with a key to the observations noted by Miss Molesworth with such careful and methodical exactness.

Monthly abstracts and summaries of the weather and meteorological phenomena, and of the observations relative to animal and plant life, are drawn up with great accuracy by Miss Ormerod, from which the comparison of one year with another throughout the whole series may be easily and satisfactorily accomplished. In a general summary of the period specially dealt with in this volume, from 1825 to 1840, the main points of the extended observations are given in a condensed form. Each year is placed on a separate page, and divided according to the quarters of the year, so that the parallel characteristics of each successive season may be seen at a glance. In summing up the results, many excellent suggestions are made, and valuable conclusions drawn from Miss Molesworth's observations, especially so far as they bear on meteorological and phenological coincidences, and the general results are expressed in such terms as render them of great value in showing the bearings of the influence of the weather and the season upon our food crops.

Whatever helps to elucidate the relations existing between the climate of the various seasons, and the influence it has on the well-being of animal and plant life, must be of infinite value to the agriculture of the country, and the treatise before us furnishes a large supply of information of a remarkably accurate and reliable nature upon this highly-important subject. Although these records are in themselves of the greatest value, it is clear that they must be supplemented by others, as diligently observed and accurately noted, for a much longer term of years, in order that useful and well-founded deductions may be extracted from them regarding the effect upon animal and vegetable life of various conditions of weather. Those who are interested in this important work should carefully peruse this useful book, from which they are sure to derive much pleasure, and valuable instruction upon many points of great consequence in their bearing upon the investigation of natural phenomena.

*The Fern Paradise.* By FRANCIS GEORGE HEATH. Serial Issue. Part V.
London: Sampson Low, Marston, Searle, and Rivington.

The fifth part of this very interesting and readable book contains several chapters of much value to all who take an interest in the culture of Ferns. Useful information is given on the ornamentation with ferns of houses and gardens, in chapters devoted to "A Fern Paradise at Home," "Fern Windows," "Ferns and Aquaria," "Ferns on the Lawn," and so on, each subject being treated in such a popular and easy manner as to render it attractive and interesting to the general reader, as well as to the enthusiastic lover of this graceful tribe of plants.

A subject of special importance to all classes of persons who take an interest in plant culture, is that discussed in the chapter on "Fern Windows," in which the author says:—"Let us see how the shady windows of a dwelling-house may be made beautiful by the presence of ferns. We will begin at the basement. Here we shall find, as in thousands of London and other city houses, a window or windows looking out upon what is popularly called the 'area.' Such windows are invariably immersed in shadow, and given up as they are to the domestics of the household, one may perhaps not unfrequently see, as one passes, the window-sills adorned by modest pots containing geraniums, calceolarias, fuchsias, or the golden-green leaf and golden flowers of the sweet but modest musk plant. Rarely do we see ferns in such windows. But why should they not be there? Let them by all means be mixed with such flowers as will thrive in these windows. But when flowers need to be excluded, by reason of the uncongeniality of the situation, let the ferns at least remain. By the tasteful arrangement around and about such windows of virgin cork, with provision of 'pockets' for ferns, or by the skilful use of cement and pieces of stone, or brick disguised as stone by a sprinkling of the dry powder of cement—due provision being made for drainage—an 'area' window might be made really charming. Or suppose the basement windows of a house are half below the garden or area level. In such cases there will be a space commonly called a 'well' outside such windows, having usually three bricked sides, in addition to the window side. By putting a glass top or frame to such a space an admirable little fern-house will be created in which ferns will thrive, and find excellent protection against winter frosts. With trowel and cement it will be easy, in a 'well' like this, to establish a miniature 'Fern Paradise.'"

The tasteful illustrations which form so prominent a feature of this charming work, continue to be freely introduced, the present part being illustrated by an excellent photograph of "A Green Lane," a full-page engraving of "A Fern Window," with a number of beautiful illustrations of ferns in various positions, and of graceful shapes and forms.

*Cassell's Publications.* London: Cassell, Petter, Galpin and Co.

Among the host of serial publications issued by this well-known and enterprising firm, it is a somewhat difficult task to make a selection for special notice or recommendation, where all are so excellent, both in regard to subject and get-up. From the *Magazine of Art*, *The Countries of the World*, *Picturesque Europe*, *Our Own Country*, *Science for All*, *Dairy Farming*, *Natural History*, *Book of Poultry*, *Book of Canaries and Cage Birds*, *Familiar Wild Flowers*, *European Ferns*, the *Technical Educator*, and numerous other well-written and beautifully-illustrated works, now being issued in serial form, the most fastidious reader cannot fail to find something to please and instruct. The following short extracts from the May numbers for which we only can find room, give an idea of the interesting nature of some of these publications:—

### "A COLONY OF HERONS.

The tops of the highest trees are usually occupied by the nests of the Common Heron; a little lower down is the habitation of the shy and beautiful Great Egret, while among the forks of the lowest branches the Night Heron takes up her abode. All these species build in one and the same tree, the nests numbering not unfrequently as many as fifteen in a single tree, and yet peace invariably reigns between all these varieties. High over the trees appears the Common Heron, laden with booty, announcing his arrival with a hoarse *craaich*, when, changing his note to a goose-like *da-da-da-da*, he either jerks the provender down the throats of his ever-hungry youngsters, or throws it up before them, when the fish are greedily swallowed amid a desperate accompaniment of *gohé-é-é-é, gohé-é-é-é*, a sound much resembling the frantic cry of a calf which is being lifted into a farmer's market-cart. The conduct of the more cautious Egret is very different. Circling far above the nest, she first satisfies herself that no foe is hidden below before she alights amongst her family, which are much quieter and less hasty than their cousins. The Night Herons, on the contrary, approach their nests from all sides, high and low, their crops filled with frogs, fish, and insects. A deep *quâk* or *gowek* announces the arrival of the old bird already from some distance, to which the young answer while feeding with a note resembling *queht, queht*, or *quehaoâheh, quehoehah*. As soon as the parents have taken their departure the youngsters recommence their concert, and from every nest uninterrupted cries of *tzik-tzik-tzik, tzék-tzék-tzëk, tzgé-tzgé-tzgé*, and *gétt-gétt-gétt*, are the order of the day. This amusement is varied by the nestlings climbing out among the branches till they reach the top of the tree, whence they can have a good look-out, and can see the old birds returning home from along distance, though they are in many cases often mistaken as to their identity."—From *Cassell's Natural History*.

### "EXMOOR.

Exmoor—using the term in rather a wide sense—is a broad strip of almost mountainous moorland, which extends from east to west along the coast of North Devon and Somerset. The boundary of its eastern part—more properly termed the Brendon Hills—is marked by the strip of lowland which cuts it off from the Quantocks; on the west it may be regarded as terminating a little on that side of a line drawn southwards through Lynmouth, though high, ridgy land, similar in character, but at a lower level, and for the most part under cultivation, extends to the sea on the shore of Morte Bay. Its hills are formed of hard, gritty rocks, which sometimes rise in fairly bold cliffs, but more often form a stony moorland. This is commonly bare and open, overgrown with heather and ling, brake and whortleberry, and stunted furze; but the sloping flanks of the valleys are often thickly clothed with wood, as no doubt they have been for tens of centuries past. Here and there in the hollows, and even on the hills, are patches of bog, dark and oozy—more numerous and more dangerous in former times, but now diminished by drainage and cultivation. The hills descend precipitously to the sea, and therefore the watershed is too near it to allow of any important streams descending from their northern slopes. The Lyn, by a devious course, for a time almost parallel to the coastline, alone, among its brooks, has any claim to be called a river; but on the southern side the Exe begins its long and winding journey towards the British Channel."—From *Our Own Country.*

"GIBRALTAR:

Where least expected, the gleam of a bayonet or the red coat of a sentinel peeps out from among a leafy screen, and the guns of strong batteries, like the well-named 'snake in the grass,' proclaim themselves even when their muzzles are smothered with flowers. Uniforms predominate among the crowds that throng the narrow streets: fatigue parties are moving rapidly to and fro; here artillerymen are busily engaged mounting or moving an eighty-one ton gun; there a handful of skilful engineers are repairing, constructing, and controlling the labours of others. Other unmistakable symptons of military possession are to be seen on every side: in the keen scrutiny of all strangers who would seek to enter, whether at Landport or Waterport, where aliens must produce or obtain permits, and even Englishmen must prove their nationality in words analogous to the ancient *Civis Romanus sum;* in the precision with which the gates are opened and closed at the sound of the morning and evening gun, when with much pomp and ceremony the 'keys'—badges of ownership which are formally handed over to a new governor when he takes the oath at installation—are marched under escort from the governor's guard, and the process of lifting or lowering drawbridges, locking and unlocking the massive portals, which turn slowly on their hinges, is punctiliously performed by an officer of standing and trust. Assuredly it seems impossible that Gibraltar should ever again be carried by a *coup de main.*"—From *Picturesque Europe.*

"PECHABURI.

With the exception of Bankok, there are few other large towns in Siam worthy of note. Among the exceptions may be included Pechaburi, about a hundred miles south-west of the capital, where the king has built a palace, and the reputation of which for healthiness is such that both the Europeans and natives use it as a sanatorium. It is built at the mouth of the Pechaburi River, near the range of hills which divide Siam from the Tenasserim province of British Burmah. Though its appearance would not lead one to imagine it thickly populated, yet so closely do these Oriental people huddle together that we are not surprised to learn that there are some 20,000 inhabitants in this peculiarly Siamese town. The king's palace is built on the summit of a hill at the back of the city, and on an adjoining eminence are some pagodas and temples, and near the foot of it various Buddhist monasteries, the inmates of which are occupied in instructing native youth gratuitously. In this locality is also a cave 'filled with idols,' chiefly gilt Buddhas, and the entrance to it is shaded by trees filled with chattering monkeys. The king lives for a few months in the year at Pechaburi for the sake of his health, and since he has acquired a taste for European luxury is fond of driving along the excellent roads which he has constructed in and about the city. The governor of the place was also met by one of the latest visitors driving in a 'buggy,' the buggy and the European shirt and sun-hat being the outer emblems of the Western habits which are being so rapidly engrafted on the Siamese, the 'panoung,' or cloth worn round the waist and passed between the legs with striped socks and patent leather slippers, and the finely-wrought gold 'xroh,' or betel-box, being the native side of his Excellency's culture."—From *The Countries of the World.*

## OUR FOREIGN EXCHANGES.

There have been received from Bohemia, *Haj*, No. 4; *Domacnost*, No. 4; from Austria, *Oesterreichische Gartenlaube*, Nos. 13,14,15,16; *Handelsblatt*, Nos. 17, 18, 19, 21; from Germany, *Deutsche Tischler Zeitunq*, Nos. 9, 10; *Wochenschrift*, No. 17; from France, *Revue des Eaux et Forêts*, No. 5, and *L'Echo Forestier*, No. 330; and from Spain, *Revista de Montes*, Nos. 79, 80. Besides these have been sent to myself from Spain six numbers of the *Revista Forestal Economica y Agricola*; and from Denmark, *Sygdomme hos skovtraeerne foraarsagede af ikke-rustagtige Snyltesvampe. Af* E. Rostrup.

The numbers of the *Revista Forestal Economica y Agricola* contain a series of papers by Don Andres Llaurado, on what he considers erroneous views advanced by Professor Don Pedro Perez de la Sala, on Inundations, a subject commanding of late considerable attention in Spain in consequence of the destructive effects of inundations which occurred last year in Murcia, Alicante and Almeria. Some ten years ago there was published a valuable treatise by S$^r$. D. Francisco Garcia Martino, under the title *Los Montes y el Cuerpo de Ingenerios en les Cortes Constitutyentes*, "The Forests and the Foresters in the Cortes," in which he spoke of the effect of forests in preventing or moderating inundations. By S$^r$. D. Pedro Perez de la Sala, Professor in the College of Civil Engineers, charged with the erection and maintenance of Roads, Bridges and Harbours, subsequently published in the *Revista de Obras Publicas* (the Review of Public Works) a paper on Inundations, designed apparently as a reply to the former; at any rate, he endeavoured to show that it was impracticable and not absolutely expedient to attempt to prevent occasional inundations, and attacked, unsparingly, a memoir on inundations of the Júcar in 1864, by the Illustrissimo S$^r$. D. Miguel Bosch y Juliá, chief of the Commission of Inquiry which had been appointed. And S$^r$. D. Andres Llaurado, a man of European fame and distinguished writer on the subject, who had been engaged in the inquiry, came forward to defend the Report, S$^r$. Bosch being in a delicate state of health.

The first point laid down by S$^r$. de la Sala which he assails, is an allegation that inundations do upon the whole more good than harm. The second is that there has been no increase in inundations and low waters. S$^r$. Llaurado alleges that the statistics adduced by S$^r$. de la Sala in support of his first position are imperfect, and so far as they go rather prove the contrary, and that he adduces none in support of the second, and he gives *in extenso* a report on low waters in the Seine by M. Belgrand, published in 1865; and while S$^r$. Sala alleges that the good resulting from inundations bringing down fertile soil from the higher-lying lands to enrich the plains, S$^r$. Llaurado states that forests are undermined and mountains destroyed, and the maintenance of a humid atmosphere by the trees and of mountain springs is thus rendered impossible. And while he maintains that the absorbent powers of different soils can be accurately determined, he says: Sala confounds absorption with filtration. He alleges that in treating of inundations, &c., there exists no necessity for taking into account the diminution of water by evaporation, vegetation, &c., as during the fall of great rains evaporation is impossible; and S$_r$. Llaurado asks in reply whether this applies also to inundations occasioned by thaws, which were those which had been under discussion. In regard to absorption by vegetation he maintains, on the alleged authority of M. Matthew, of the School of Forestry at Nancy, that upon an average 7 per cent. of the water which falls as rain is thus absorbed, and he cites statistics by Krutsch which go to show that only 25 per cent. of what falls as small rain reaches the soil in the forests of the Erzgebirge, &c. And there follow discussions of theories which have been formed in regard to influences affecting the distribution of the water flowing in the new bed.

Of other papers there is one on different modes of taxing or estimating and valuing forests and timber, in which there is no end of German authors cited. There is also one on the geology of Cuba, one on forest legislation, directed against the abuse of alienation of Crown forests, which has for years been a curse to Spain, &c., &c.

In the pamphlet by Mr. Rostrup, a continuation of a paper which appeared in a previous number of the *Tidsskrift for Skovbrug*, in which this also appeared, are given valuable notices of *Hymenomycetes*, *Tremellineæ*, *Uredineæ Ascomycetes*, and of *Peronosporeæ*, &c., and of their effects upon forest trees.

In the *Handelsblatt für Walderzeugnisse* appears a series of articles on Cellulose as an Article of Trade; its Condition and Manufacture.

In the *Tischler Zeitung* are several papers on Cabinet-makers' work.

JOHN C. BROWN.

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**DESTRUCTION OF FURZE.**—About forty acres of furze and underwood, the property of Colonel Loyd-Lindsay, near Newbury, Berks, have been destroyed by fire.

# UPROOTING OF CONIFERS, AND TOP-DRESSING ROOTS OF TREES.

THE following interesting correspondence, arising from the uprooting of many valuable conifers by the Tay Bridge storm in its course over the middle of Scotland, on the 28th of last December, has recently appeared in the *Gardener's Chronicle*. Mr. Culverwell, Thorpe Perrow, says:— "The loss of such trees as the *Araucaria imbricata* and *Abies nobilis* at Keir, Perthshire, is deplorable, and every means should be taken to prevent further loss if possible. The coniferous trees are not generally deep-rooted; we have lost many fine spruce trees from being uprooted with the wind, and on examination I have found all the roots within about 15 inches of the surface in a perfect mass; consequently trees with such a weight of foliage must give way before the wind sooner or later. After taking particular notice of the fall of the spruce trees, I became alarmed for the safety of a few handsome trees, one in particular, a noble specimen of *Abies nobilis*, which stood very much exposed to the north-west gales. On the roots of this tree I put twelve good cartloads of soil, which raised the surface about 12 or 15 inches up the stem of the tree, sloping gradually away some distance beyond the extended branches. It rather improved the appearance of the tree than otherwise. This was done about eight years since; the soil is now full of roots, and the tree appears as firm in the ground as a tower. If so little labour would save such fine trees as those which, I fear, have been lost, would it not be wise to do it? I should add that the tree has made wonderful growth every year since the soil was put on, on three occasions making a leading shoot quite a yard in length."

Mr. Rust, Eridge Castle, remarks that—"Mr. Culverwell in recommending the surface-dressing of the ground under coniferous trees has, in my judgment, hit the right nail on the head, except that I do not agree with him in placing it round the stem or collar of the tree, as in many instances that would, if done indiscriminately, kill the tree. Surface-rooting trees like the conifers are wonderfully benefited by soil placed over the roots, and if I remember rightly that veteran in the Pinetum, Mr. Frost, of Dropmore, often surfaces his plants. Certain it is that it at once nourishes the roots and steadies the tree. Thirty years ago a good deal of levelling was done in the garden here, and 2 feet of soil had to be laid over the roots of a cedar, bricks were placed round the tree, 1½ feet clear of the stem, and then the earth was placed over the roots and up to this brickwork, but not a spade inside; the result is that it is now a magnificent tree of eighty summers. What a pity the *Cedrus Libani* and *C. atlantica* are not more planted: there is not a tree of the former 250 years old in this country, and yet what magnificent specimens one sees occasionally. But I must hark back to my surface-dressing. Well, at the same time and place a quantity of soil had to be carted out into the park, it was spread round a deciduous tree, I forget whether beech or sycamore, but there was no protection to the collar of this tree, and the result was that it died the same summer; therefore my advice in planting conifers is to plant high, and then they can be surfaced with impunity without covering the collar."

Mr. Keetly, Darley Abbey, Derby, adds: "Mr. Culverwell's advice and practice, in surface-dressing large conifers as a means of adding vigour and stability, all must admit to be sound and good, and, as Mr. Rust has it, hits the right nail on the head; but I much doubt if Mr. Rust himself has made as good a hit in advising conifers to be planted high (above ground level I take it), simply for the sake of being able to surface-dress them so as to enable them to better resist the force of the storm. Unless the situation is low and wet I would never plant conifers or any surface-rooting trees above the natural ground level, as in hot dry summers they are apt to suffer much in their young state for want of moisture. Mr. Culverwell, like Mr. Frost and many others who pride themselves in the noble specimens they have taken such pains in cultivating, prepared the soil thoroughly by deep trenching, &c., before planting; and on ground thus prepared conifers will not usually require surface-dressing until they have attained a good size, say fifteen or twenty years' growth. I think Mr. Rust is far off the mark in predicting death to trees of this age, by a reasonable amount, say 1 or 2 feet, of soil being placed close round the collar or stem of the tree; and I venture to suggest that there must have been some other cause for the death of the sycamore or beech tree he describes as having died the same summer after being so treated. I only wish it was possible to kill a large deciduous tree by simply mounding soil around its trunk—the doom of one that is darkening my window would soon be sealed. Some years ago I had much of this tree-surfacing to do in levelling a large tract of lawn containing beech, sycamore, oaks, and Scotch firs. One of these trees had as much as 4 feet of soil firmly raised round its trunk, extending a considerable distance beyond its roots, and the remaining nine or ten trees had from 1 to 3 feet of soil thus added. I watched these trees closely for several years after, and I fully believe the addition of soil did good to them, at any rate their foliage was green and vigorous during a hot dry summer that soon followed, whilst most of the trees around them suffered much in their foliage for want of moisture at the root."

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INSECTS INJURIOUS TO LARCH.—At a meeting of the Scientific Committee of the Royal Horticultural Society, held on the 27th of April, Mr. Elwes exhibited specimens of larch covered with the eggs of a Chermes, besides vast numbers of the larvæ of a moth, *Coleophora laricella*, which eat into the leaves, and make cases for themselves of the cuticle. For such a case, where the insects are so numerous and widespread, an effectual remedy is not known, but it was suggested that setting fire to the long grass might be efficacious by destroying the moths harbouring amongst it. However, great precaution is necessary in applying such a dangerous remedy, as in most larch plantations there would be a great risk of destroying the larch along with the long grass.

THE PINES : *Pinus*.—Dr. Engelmann, of St. Louis, has recently published in the *Transactions of the St. Louis Academy of Science* a valuable revision of the genus *Pinus*, the substance of which we may transfer to our columns hereafter. In the meantime we may state that the primary divisions are founded on the form of the cone-scales, the form of the connective of the anther, the position of the resin canals of the leaf—near the skin of the leaf, in the cellular tissue of the leaf, or close to the bundle sheath—the presence of strengthening or hypoderm cells, the proportion of the wing of the seed, the subterminal or lateral position of the cones, the number of leaves, &c.—*Gardeners' Chronicle.*

THE SHAMROCK.—It is, I am told, a common notion of the Irish that this emblem of their country will not grow in this country. A few days ago I was reminded, on the return of St. Patrick's Day, to go into my garden and search for some shamrock I planted just a year ago, which had been sent to me from county Dublin, and there it was, "shure enough, in all its emerald freshness," like the fair daughter of Erin who so kindly sent it to me. Wishing to be better informed on the subject, wrote to a distinguished lecturer on botany, asking whether the plant did degenerate in this country into trefoil. He says:—"Which is the true shamrock of Ireland? Some say *Oxalis acetosella*, others *Trifolium repens*, and other plants have been named. It is clear that in Ireland both *Trifolium filiforme* and *Medicago lupilina* are worn. I cannot presume to say which plant is the national emblem of Ireland, but the plant sent is certainly not an oxalis, but appears to be *Medicago lupilina*, but it may be *Trifolium repens*, or certainly some other trifolium; but I have not examined it very carefully, as I thought you only wished to know whether it was oxalis or trefoil. *Medicago lupilina*, although not a trifolium, is commonly known as hep-trefoil. *All the plants commonly known as shamrock flourish on English soil!*" I think some of your readers will like to know this. I may add that Messrs. Carter, the well-known seedsmen, confirm this, and state that in the South of England large quantities of the true shamrock are grown.—PETROS.—*Land and Water.*

THE SILVER BIRCH.—I have often felt surprised that this tree should not be more extensively planted in pleasure grounds, parks, and on large estates generally than it is. In manner of growth it is so graceful, so distinct from all other forest or hardy trees, as to render it eminently fitted for purposes of isolation. A large, well-developed tree, so placed that its natural habit is fully displayed, forms a very pleasing feature in the garden landscape, not only when in full leaf, but also during the winter months, when, denuded of foliage, its characteristic features are more fully revealed. The graceful, spray-like, pendulous growth and silvery bark show up charmingly against the fresh bright turf of a well-kept lawn, a tree dotted here and there about pleasure grounds doing much towards relieving them of their sameness and, where evergreens are largely employed, somewhat sombre aspect during the dull months of the year. There are, however, a variety of ways in which the Silver Birch might be employed. It has a very pretty appearance when so placed among coniferous tree and evergreen shrubs that they form a background to it, in such a manner that the head of the Birch stands out clear and well defined, whilst the white stem is as it were framed in verdure. In parks, good use might be made of this tree by grouping it here and there in such a manner that the bright stems would be distinctly visible when the foliage was off. I may mention, however, that there is considerable variety amongst the Silver Birches—some having the bark much more silvery than others, and having consequently, from an ornamental point of view, a much higher value. It is a pity that seeds should be saved from inferior varieties. Were a rigorous selection made, choosing only those trees remarkable for their clean white bark, a great improvement would in the course of time be manifested, and the value of this tree from a decorative point of view would be sensibly increased.—J. C., in *The Garden.*

RATS DESTROYING A PLANTATION.—I have received the following:—"I take the liberty of sending you by this post a small box containing a species of rat that has infested a plantation on my property in Northumberland for some months past, and which has done incredible damage to the young trees planted there. Although the trees have been planted some six or seven years, the devastation by these animals is such that they are toppling over in every direction. The vermin appear to burrow to within four or six inches of the surface, so that in walking over it, you feel it to give way under you at almost every step. This is a species of rat that I am altogether unacquainted with, and which appears tobe unknown in this district. I venture to ask you to favour me with your opinion as a naturalist as to its species, and the best mode of exterminating it. I have endeavoured to poison them, but as they appear to feed mostly on roots, this mode of destruction has proved ineffectual. To-day I used a small ferret, and was successful in the course of an hour or so in bolting five or six, which were destroyed." The rat sent was simply a water rat or vole. I cannot think how these rats accumulated in such large numbers. Will any of our correspondents kindly assist in advising what is best to be done to prevent such destruction?—FRANK BUCKLAND, in *Land and Water.*

WINE OF BERBERIS AQUIFOLIUM.—According to Dr. Engelmann this is called Mountain Grape in Colorado; and the juice, when fermented, makes, on the addition of sugar, a palatable and wholesome wine.

A FOREST ON FIRE.—Ashdown Forest, in the north of Sussex, the scene of the recent litigation between Earl Delawarr and Mr. Bernard Hale, J.P., and others, has been set on fire by incendiaries three times lately. On the night of the 17th of April it was ignited near East Grinstead; and again on the afternoon and night following at Duddleswell, and a considerable portion was burnt. Two days afterwards a man named Jonathan Richards was charged before the East Grinstead bench of magistrates with setting fire to it near Broadstone Warren, and was remanded. About an acre of the forest has been consumed. The matter has caused great excitement in the neighbourhood.

FOREST FIRES IN THE UNITED STATES.—Terribly destructive forest fires have lately been raging in various parts of the United States. In the counties of Ocean, Monmouth, Cumberland, and Atlantic, in New Jersey, hundreds of square miles of cedar and pine forests have been devastated, and extensive tracts of cultivated land laid waste. Houses, farm buildings, fences, telegraph poles, and every kind of wooden erections, have been swept away by the roaring flames. Large numbers of cattle, horses, and other live stock have been destroyed, and millions of game and other birds have been suffocated by the smoke, which was stifling for miles around the burned district. Some of the fires were started by locomotive sparks, and others from carelessness in burning brush. About Forked River, Manchester, Tom's River, Cedar Creek and other places, the villagers have been fighting to save their property, by setting back fires. Forest fires of alarming proportions have also prevailed in the counties of Munro and Pike, in Pennsylvania, destroying a wide extent of forest and large quantities of game. From Virginia forest fires are reported of unprecedented extent and damage. They have chiefly occurred in Prince George's, Dinwiddie, Chesterfield, and Sussex Counties, and have been fanned and increased by the dry, warm, windy weather, which prevailed there for some weeks. The fires have raged terribly in the dismal swamp, and have enveloped the whole of Lake Drummond. Bears, panthers, deer, and other wild animals, driven from their lairs in the forest, have overrun the adjoining cultivated country. Several persons have lost their lives in these fires The heavy rains in the end of April helped to extinguish most of the fires then raging, but a Reuter's telegram of May 13th says that fires have again broken out in the forests in the south of New Jersey, and in the oil regions of Pennsylvania. The conflagration is spreading, and causes immense destruction of oil and agricultural property. Large extents of forests and several villages are said to have been destroyed by the ravages of the fires.

APPOINTMENT.—Mr. Thomas Hogg, who has been for some years forester to J. H. Arkwright, Esq., at Hampton Court, Herefordshire, has been appointed forester to the Marquis of Anglesey, on the Beaudesert Estates, Staffordshire.

CORK.—The Cork Oak closely resembles the *Quercus ilex*, L., or evergreen oak so well known in English shrubberies. It is indigenous to the mountainous regions of Spain, Portugal, and the south of France. It grows from thirty to forty feet high, and from two to three feet in diameter. Spain and Portugal supply the greatest portion of the cork which is used in Europe ; abundant supplies are also received from the south of France at the foot of the Pyrenees, the islands of Sardinia and Corsica, and the forests of Algeria. When this tree is about five hears of age, the cork, which composes the greater part of its bark, begins to increase in a very remarkable manner. Nearly all its vegetative activity seems to be concentrated on this part, which grows unusually large, thick, and spongy. If left on the tree, it becomes cracked and so deeply fissured that it is unfit for use. It is therefore removed before this happens. Its removal does not injure, but is beneficial to the tree, for if the cork is allowed to remain on its stem the Cork Oak seldom lives longer than fifty or sixty years ; if, on the contrary, it is removed, the tree flourishes sometimes for upwards of 150 years. After the tree is thirty years old its cork may be removed at intervals of from six to ten years. The first crop of cork is generally inferior in quality, and is principally used for making floats for fishing nets. The crops are usually gathered in the months of July and August. Two opposite longitudinal incisions into the bark are made the whole length of the stem, and then several tranverse ones about three feet apart. The bark is now beaten to separate it from the subjacent liber, and detached in cylindrical pieces by inserting under it the handle of the instrument, which is curved and made thin at its extremity for this purpose. In affecting this removal great care is taken not to njure the newly-formed suber or cork—viz., the living layer of cork beneath. After barking, the pieces of cork are slightly charred to close the pores, then loaded with weights to flatten them, and finally stacked in square masses in some dry place, where they remain for two or three months. In drying they lose about one-fifth of their weight. Only when the trees are forty or fifty years old is the bark sufficiently matured for making good corks. This substance is valuable for bottle corks, because it is light, porous, compressible, and sufficiently elastic to adapt itself to the neck of a bottle. It can be cut into any shape, and notwithstanding its porosity, is impervious to any common liquid. These qualities make it superior to all other substances as a stoppering for bottles, for which it is principally used.—From *Cassell's Technical Educator* for May.

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THE influence of forests upon the rainfall of a country has received a large amount of attention from scientists for a considerable period, especially in countries subject to periodical droughts, and the consequent failure of the crops of the cultivators of the soil. Suggestions have been made and theories promulgated upon the special nature of the influence which large masses of trees possess in attracting moisture-bearing clouds, and causing them to discharge their watery contents on a parched and thirsty soil. Still a divergency of opinion prevails to some extent as to the real nature of the action of forests in producing rain from a moisture-laden atmosphere. This action and the influence it has upon rainfall is rationally and clearly explained by Professor Samuel Cooke, M.A., F.I.C., F.G.S., &c., Professor of Geology and Chemistry in the College of Science, at Poona, India, in a recent communication to the *Bombay Gazette*, and which, through the courtesy of the author, is now before us in pamphlet form. The importance of the subject, and the intrinsic value of the opinions so ably expressed by Professor Cooke, compel us to quote them fully for the benefit of all whom it may concern. He says:—

"Ever since the publication of Sir Richard Temple's celebrated Minute on Forest Conservancy in the Deccan, the Indian newspapers have furnished the public with a vast number of articles and letters on a variety of topics connected with forestry in India. But as none of these communications (at least none that I have seen) pretend to offer a satisfactory explanation of the manner in which the growth of forests tends to influence rainfall—which to India is the most important problem connected with the subject—I venture to state very briefly what I believe to be a correct and scientific way of explaining this most interesting point.

"The fact that the mean annual temperature of the whole earth is a well recognised constant (*i.e.*, averages the same one year with another) implies that the quantity of heat annually received from the sun is balanced by an equivalent loss of heat through radiation into space. This conclusion, however natural it may seem, is not really correct: for from recent calculations and experiments of Irish and American savants it appears that the loss of heat from the earth by radiation into solar space falls considerably short of

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the amount of solar radiation she receives in the year. Thus it is shown in a paper by Dr. Haughton, Professor of Geology in the University of Dublin, an abstract of which was read before the British Association Meeting last August, that the amount of sun heat annually received by the earth is equal in amount to the heat required to melt a coating of ice 80 feet in thickness all over the globe, and that the mean annual radiation of heat from the whole earth is equivalent to the melting of a coating of ice only 28½ feet in thickness. There is, therefore, a balance of heat received, equivalent to the melting of 51½ feet of ice, to be accounted for, as the mean temperature of the earth's surface is not increased.

"What, then, becomes of this balance of solar radiant energy?—for a balance there is even after making due provision for the geological work done by the circulation of water, &c.

"The only possible scientific answer, 'that will hold water,' is that this balance of solar energy is converted into—another form of energy—vegetable life, and of course ultimately into animal life.

"In support of this conclusion, and also to connect it with the subject under consideration, it may be generally stated that the growth of vegetation is accompanied by a disappearance of heat; for, as every chemist knows, the resolution of a compound (*i.e.*, the separation of its constituents) is invariably accompanied by a reduction of temperature.

"And what are the green leaves of the forest continually doing, while under the influence of the radiant energy emitted by the sun, but resolving, or separating the elements of, the carbonic acid gas (storing its carbon and liberating its oxygen) present in the atmosphere, and this chemical decomposition is, like others of its kind, accompanied by a fall of temperature—resulting from an absorption of solar rays.

"It, therefore, follows that, in addition to the generally acknowledged physical cooling that takes place at night over a forest (leaf) surface, owing to the great radiating power of its green leaves, there is also a chemical action going on during the daytime tending to produce a reduction of temperature over the forest surface. And now, as all meteorologists will admit that the most important condition tending to influence rainfall—to induce a more or less saturated wind to part with its watery vapour—is a reduction of temperature over a large area, I think I may safely conclude that the growth of forests over large areas tends materially to influence rainfall.

"I do not, however, believe that the planting of a patch of trees here and there can materially influence the rainfall of the future; but I should, in common with Sir R. Temple and others, like to see the treeless hills of the Deccan covered with ample forests.

"What might not the climate of Poona be were its surrounding hills but clad with forest verdure!

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"It has been hitherto generally admitted that forests do exert some mysterious influence on the rainfall of a country, and my sole object is to explain the cause of such influence on scientific principles—especially as I have not seen a satisfactory attempt at unravelling the mystery in the previous correspondence on forest topics. My contention that the growth of vegetation is brought about by the influence, and *at the expense*, of solar radiation, is perfectly demonstrable by experiments within the domain of chemistry. Experiment shows that the assumption of a green colour (the formation of chlorophyll) by a germinating plant is coincident with its decomposition of carbonic acid; and, moreover, this vegetative process cannot be brought about by such artificial means as the application of the heat from a stove, &c.,—a real absorption of solar rays being essential to the process. Through the absorption of solar radiations the plant decomposed carbonic acid and water, liberates oxygen and retains the carbon and hydrogen (sometimes with a little oxygen) as vegetable tissue which, ultimately becoming the food of animals, is reoxidized or reconverted into carbonic acid and water—thus returning to vegetable food. In separating the carbon from combination with oxygen *work is done*, and consequently *heat disappears*—the heat of the absorbed rays. It must not, however, be supposed that these absorbed solar rays are annihilated; no, their energy is but latently associated with the carbon and hydrogen molecules retained by the plant, and it is their equivalent that is again set free when wood is burned or when animality is sustained by the consumption of vegetable food. Such is the routine by which the circulation of the force obtained from the sun is kept up between the vegetable and animal kingdoms—solar energy being absorbed or accumulated by vegetables, but dissipated, though not destroyed, by animals. The tendency, then, of a forest leaf surface—partly from the chemical action involved in its growth and partly from the physical action, owing to which the leaves lose heat by radiation—is to act the part of a *refrigerator*, and thus to aid in bringing down rain when clouds or winds saturated with moisture pass over it.

"From what I have already advanced I think it may be safely inferred that science warrants the entertainment of the opinion that the existence of forests on a *grand scale* tends to promote the precipitation of the moisture from the more or less saturated air currents that are constantly passing over them—*i.e.*, in other words, to increase the rainfall in their neighbourhood. In Poona, have we not been frequently tantalized by seeing those treeless Deccan hills capped with clouds, which for weeks, at times, hold out fair promises of rain, but which ultimately become dissipated from the absence of a cause sufficient to reduce their temperature ever so slightly? In such cases once the rain is well started, the cooling influence of the rain itself tends to keep up the process of condensation.

"What India wants is a guarantee against famine; and the Government of the country have made an effort at obtaining a fund for this purpose by means of a licence-tax. Could there be a better way of investing this famine fund than by spending it in promoting the clothing of the waste lands and barren hills of the Deccan with suitable forest vegetation?

"Of course, I am aware that there are other aspects in which the forest question may be profitably considered; such, for example, as that originally pointed out by Humboldt, concerning the storage of rainfall and the maintenance of springs, &c. But all these points appear to me secondary in importance as compared with the direct influence of forests on rainfall.

"I do not pretend to maintain that in the restoration of forests *alone* we should look for the salvation of the Deccan. For even the planting of trees, especially on culturable land, has its drawbacks. It not only diminishes the area of cultivation, but also imports a lot of hungry and thirsty trees, which lose no opportunity of devouring the natural pabulum of the ordinary crops within reach of their roots.

"Trees, however, prove serviceable to the farmer as a means of obtaining from great depths valuable manurial ingredients which are often absent in the surface soil, owing to its having been robbed by the system of cultivating without manure which prevails in India, where the rainfall, so capricious in its distribution, is almost the only "manure" the ryot, or farmer, ever thinks of applying to the hungry soil. It is therefore in-

**cumbent upon the Government to restore, as quickly as possible, its forest-clad hills to India, and to extend the forest area over large tracts of waste and otherwise useless land, wherever the necessities of the inhabitants, the barrenness of the land, or the parching climate requires the produce and the ameliorating influence of trees."**

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THE art of transplanting has been brought to such a state of perfection in these days, and its principles are so well understood, that we do not doubt but that the largest and oldest of the monarchs of our forests could be transplanted with success, by careful and skilful men, with ample means at their command. As a feat of engineering skill combined with a knowledge of plant life, the successful transplanting of an aged tree is a triumph of which the operator may feel a just pride. However, when the subject operated upon is a well-known venerable tree, with many revered associations and historical incidents connecting its past life with the site on which it has grown for many centuries, it becomes a question of doubtful taste, closely approaching sheer vandalism, to remove such a notable and venerated object from its natal spot to however short a distance. In careful hands, the risk of losing the tree is reduced to a minimum, but still there is the risk of losing a venerated landmark, which cannot possibly be replaced by the hands of man. But the mere fact of such a tree being removed from the historical spot on which it has existed from time immemorial, destroys at a blow all the most venerated and pleasing associations with which it is connected in the mind of the lover of ancient trees and tree lore. It may survive for ages as a monument of the skill of the transplanter, but its former history and interest are in a great measure destroyed, by the fact that the spot which formerly knew it shall know it no more. The money and skill expended on the removal of a tree "over 1,000 years old," would be much better expended in securing its protection and continued growth on the site upon which it has so long thriven, and with which its whole life-history has been associated. It is hardly possible to conceive a reason that would justify the removal to another site of such an enduring landmark, and nothing in good taste and a proper association of ideas would warrant such unnecessary interference with one of the most interesting features of Nature, and the growth of unknown ages.

We have been led to make these remarks from an account which has appeared in our able contemporary, the *Gardeners' Chronicle*, of the recent removal to a short distance from its pristine site of the celebrated Kentish Yew, growing at Buckland, about two miles from Dover. Of the success of the operation there need be no doubt, if due care is taken to supply the necessary wants of such a remarkable aged transplant; but we trust that few such experiments will ever be attempted, the propriety of which is so very doubtful and so much against the dictates of good taste. Our landscape planters have abundance of suitable trees, of every requisite size and appearance, but with no special history, from which to cull the specimens they may require to transplant, to fill in their compositions and give the desired effect in the shortest possible time. But in these laudable operations the ancient and historical monarchs of the forest should certainly be spared, and left to adorn the earth in the spot where in all probability Nature alone has placed them.

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THE list of prices of forest produce which we annually publish with our June Number is specially designed to meet a much-felt want amongst foresters who are located in so many out-of-the-way parts of the country, and who have few opportunities of comparing the prices realized in their own district with those obtained throughout the country. From numerous letters received from our readers, we are glad to find that our efforts in this special line are thoroughly appreciated; and the returns, which through the kind courtesy of our correspondents we are enabled to lay before them, are anxiously looked for, and every year more and more carefully scanned. By the information thus required a good market has been obtained, which in some instances that have been brought under our notice has increased the value received forty to fifty per cent. of certain descriptions of forest produce. Besides, much interest is felt by all our practical readers in comparing the prices of the various items in the table with those which they obtain for the same article, and they can calculate therefrom whether or not they have been able to realize a fair average during the past season. However, the useful nature of the information contained in these returns is not only highly valued by foresters alone, but by everyone who is interested in the growth, sale, and manufacture of timber, and other produce of the forest. The landowner, estate manager, timber merchant, builder, mine-owner, railway company, and all other users of wood are deeply concerned in the comparative value of different classes of timber in certain districts of the country. Whether looking for a market to buy or to sell in, all are equally interested in the completeness and generally accurate value of these returns, and our great endeavour is to furnish them in as complete and accurate a manner as possible. In this we have been ably aided by a yearly increasing number of contributors, who have freely furnished us with returns for their districts.

However, there are still many counties and large districts from which returns would be greatly valued, but from which we have hitherto failed to obtain them. This we hope our readers will bear in mind, and kindly give us their assistance to remedy when the season arrives again for publishing these returns. A prompt return of the schedules which we issue is of material importance to the accurate compilation of the table; and we trust that in another year, with a greatly increased number of returns, and some improvements which we mean to introduce in the arrangement of the table, we shall be able to lay before our readers as complete and useful a record of the prices of forest produce as the nature of the subject will admit.

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A HANDY implement for the cutting and trimming of grass plats, verges, borders, and similar places, where the ordinary short grass mower is not readily serviceable from want of room or want of power to work it, has long been a desideratum to the owners of villa gardens, and in elaborately laid-out flower gardens, with many narrow margins and awkward corners where it is difficult to work either a scythe or a mowing machine. The implement invented by Mr. Ridgway, of Market-place, Macclesfield, and termed a "Grass Cutting Machine," is peculiarly well-designed to meet this long-felt want, and it is sure to supersede all other implements hitherto used for a similar purpose, from its great simplicity, efficiency, and comparative cheapness. Its simple and peculiar construction, and its general adaptability, enables it to be used close up in any corner, or to any wall or fence, and around trees and shrubs without any danger to the plants, or injury to the machine. This manual grass cutter is constructed upon the same principle as the hedge cutter of the same inventor, which is now so well known and generally approved of for dressing hedges A series of blades produces by a simple movement a clean scissor-like cut with marvellous ease and rapidity, leaving behind a clean, smooth surface in places and situations where it has hitherto been impossible to cut the grass expeditiously and well. As a really useful implement Mr. Ridgway's machine will doubtless force its way rapidly into general use.

A NEW ORNAMENTAL WILLOW.—*Salix vitellina Britsensis* is recommended in the *Hamburger Garten Zeitung*, and now that the planting season is approaching it may be useful to quote the recommendation. This novelty is said to have the bark of the young shoots coloured red, like those of *Cornus alba (sibirica)*, and if so, the plant must afford a fine winter contrast to those of the golden willow. It is in the hands of M. Spath, of Berlin.—*Florist.*

# Brick and Tile Making at Pluckley.

By ALFRED J. BURROWS, Land Steward, Pluckley, Kent.

The advantages of the home-manufacture of bricks and tiles upon an estate are so numerous that no apology is necessary for treating of such a subject in a Journal partly devoted to the general management of estates, and however much other building materials may abound in any given locality, the superior advantages of bricks for thin walls, for arches, quoins, flues, chimney heads, and for purposes of ornament, and the rapidity with which structures may be run up with them, their dryness in internal walls, the regularity of their settlement, and numerous other properties, recommend them to the builder as being best adapted to the general purposes of his art.

Though the object of the present paper is more particularly to describe the modes of manufacture and the machinery in use here, a few preliminary observations upon brickmaking in general will be necessary, in order properly to point out the superior advantages derived from the use of the most improved machinery when employed upon clay of the first quality. It is not, however, my intention to travel over the wide field generally covered by writers upon brickmaking, and to survey its history from the construction of the Tower of Babel, the building of the Pyramids, and the allusions in ancient authors; but to confine my remarks to the manufacture and uses in more modern times. The remains of antiquity have conclusively shown that in early ages bricks were not only well burnt, but they were also occasionally produced glazed, or enamelled, and containing an admixture of metallic oxides which imparted colour to them.

It is highly probable that the art of brickmaking was introduced to this country by the Romans, as is shown by the remains found at their principal military stations in Britain. But from the 5th to the 13th century the manufacture seems to have been neglected; and it was not until the introduction of the Tudor style of architecture that there arose any great and regular demand for them as building materials. In specimens of 15th and 16th century structures, principally, their adaptability to this style of architecture is to be seen.

Abroad, and more especially in Italy, some remarkable specimens of brickwork may be seen in the palatial and ecclesiastical structures of medieval times. Some of these are further ornamented with terra cotta cornices of great beauty both in design and execution. By the time of Henry VIII. the art of brickmaking had arrived at great perfection in England, and after the destructive fire of London in 1666, bricks were principally used in rebuilding the city. In later years the heavy duty imposed on them lessened the manufacture. This, at one time, was fixed at a uniform sum of 5s. 10d. per thousand; and it was abolished only in 1850.

In the year 1821 the number of bricks upon which duty was paid in England and Scotland was 913,231,000. By 1831 it had risen to upwards of 1,153,000,000; and in 1840 to the number of 1,725,628,333. It has been estimated that over 2,000,000,000 were turned out in 1854 in these two countries alone. Since then the number has largely increased, and we shall probably not be beyond the mark in stating that the total number manufactured in 1879 exceeded—*

The number used by railways alone can be surmised only from the fact that an ordinary bridge to carry the traffic of a turnpike road across the line absorbs on an average 300,000; while a yard of railway tunnelling swallows up 8,000, or at the rate of about 14,000,000 per mile.

The principal qualities aimed at by the manufacturer of bricks are soundness and hardness, regularity of shape, and uniformity of size and colour—the latter being more especially necessary in facing bricks of all kinds. Besides these qualities, it is sometimes necessary to turn out bricks that will easily cut or rub. Others may be required to stand intense heat, and these must possess infusible qualities, which are in a great degree dependent upon the absence of alkalies in the clay or brick earth.

The best clays for the purposes of the general brickmaker are composed of alumina and silica, with some lime as a carbonate: portions of soda, potash, magnesia, sulphur, iron and manganese are generally present in small quantities. The strongest clays contain from 85 to 95 per cent. of alumina. These are very plastic and tenacious, working well, and increasing very considerably in bulk upon their admixture with water. Their shrinkage in burning is, however, very great, and consequently they warp and crack very considerably. What are called

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* I have been unable to obtain the figures in time for insertion in the present number of the Journal. But as a proof of the increased and increasing manufacture of bricks throughout England, Messrs. Smeed, Dean, and Co., of Sittingbourne, have given me the following items of their own trade:—

| | |
|---|---|
| "Bricks made in 1878 ... ... ... | 62,308,885 |
| Bricks made in 1879 ... ... ... | 60,287,596 |
| Bricks made up to June 25, 1880 ... ... | 36,615,076 |

If the weather be favourable, we reckon to make this season, to the end of September or beginning of October, from 75 to 76 millions."—A. J. B.

clayey loams contain from 70 to 85 per cent. of clay, and sandy ones from 40 to 70 per cent. Their friability eminently adapts them to the purposes of the brickmaker, as the sand both counteracts the shrinkage and also helps the burning. The clayey or sandy marls have upwards of 5 per cent. of lime; and when more than 20 per cent. they are considered calcareous marls. These are very difficult to work on account of their hardness. But, owing to the presence of the lime, the shrinkage is much reduced, and the proper burning is effected with less heat. One of the greatest difficulties in making bricks from these clays is experienced when the limestone is found incorporated in lumps, as the after absorption of moisture by the quicklime causes them to swell, and eventually to burst the brick.

It is a common practice for the brickmaker to mix up with the natural clays the ingredients wanting: thus strong clays will take sand or loamy earth, while loams admit of the admixture of lime or chalk This amalgamation is frequently made more complete by passing all the ingredients through a washmill. Where alkalies and oxides are present, these first assist in fusing the clays, and afterwards impart colour to the bricks. The colour of a brick is also, to some extent, dependent upon the intensity of the heat applied, the amount of sulphur in the fuel, and the quantity of water or moisture carried in by the air, or remaining in the newly-stacked bricks. Lime gives the bricks a lighter colour, magnesia a yellow tint, iron a red (of a variety of shades), and manganese a bluish tint, almost approaching black. A glaze can be imparted to some clays by the use of salt while burning, or by the use of solutions of white lead, silica, and soda.

What are known as good stock-bricks are generally made from a loamy or marly clay, additional quantities of sand being used for the facing bricks. Though breeze is generally used only in clamp-burning it may sometimes be advantageously employed even in kiln burning. The greatest disadvantage is, that it leaves the bricks more or less porous. For clamp-burning, where the bricks contain the materials for their own firing, they may be closely stacked. From 24 to 36 bushels of fine breeze will be required for every 1,000 bricks, and the clay required to make these seldom exceeds 3½ yards, though it is often considerably less.

The clays selected for pottery are generally such as are of a refractory character, and those for tile-making require to be stiff and unyielding when taken from the moulding board. The Stourbridge fireclays bear without fusion the most intense heat that can be applied to them. Next to these come the Welsh clays, then those of Newcastle and Glasgow. The bricks made from the more refractory clays may be said to be baked rather than burnt, those only which are made from the more fusible earths being in reality burnt. But with the latter the great difficulty is to obtain a proper hardness without fusion. The Stourbridge fireclay may be described as a hydrated silicate of alumina, its chemical formula being represented by $Al_2O_3$, 2 $SiO_2+2$ HO.

In nearly all plastic processes the brick-earth is wheeled and formed into heaps called "kerfs," for weathering, or the more perfect disintegration of its particles by frost and rain, and turned one or more times during the winter. All necessary additions are generally made at this stage, the added materials being put on in layers as the heap is turned. The breeze and sand are both applied in this way. Or if the clay is prepared in the washmill, it is afterwards screened and run into pits by means of shoots. When the whole mass has thoroughly subsided the water is let off. The breeze is sometimes added in the form of a thick layer at the top. In the manufacture of the London malm bricks sifted breeze is largely used, [and as these bricks contain the materials for their own vitrification, they are closely stacked in the kilns, no live holes being required.

Bricks intended for cutters or rubbers are generally made either from natural or artificial sandy loams, as clays which contain but little silica turn out bricks too hard for cutting. When they contain iron without lime the bricks generally become red if burnt at a moderate heat, the addition of lime changing the colour from a red to a creamy brown. The plastic clays found in Dorset, Devon, and in Suffolk, burn white. From the two former is made most of the stoneware in common use. Their composition is silica 76 and alumina 24 per cent., or nearly, some other ingredients being present in small quantities.

The drying of plastic bricks is a process which requires the greatest care and attention. They should be effectually protected from the sun, from frosts and rain, and also from winds which dry up the outside too quickly. Unless properly dried before burning, the steam which becomes generated as soon as they are fired will cause them to crack and burst.

In producing bricks of a superior quality by hand for any particular use, these are sometimes dressed when partially dry to prevent warping or twisting. This operation is performed with a flat beater tipped with iron.

There are few large estates upon which brick earth more or less pure cannot be found, and if the surface does not at once show it its presence may be ascertained by boring. Where the manufacture is intended only for home use, a common useful kiln to hold 20,000 bricks may be run up with an expenditure of about 30,000 well-burnt bricks. All that is further required is a temporary shed for the moulder, a roomy lodge for sand, tools, &c., a drying shed with prepared bottom and hacks, and a good pug-mill. The common flare kiln will be found the most useful in such cases, as it consumes the brushwood and refuse of the woods upon the estate. Every 1,000 bricks so burnt will consume 100 good bavins. The great secret of such a mode of burning is proper drying off. This should be effected by very slow firing for the first forty-eight hours. In this way 1,000 useful bricks may be turned out with an expenditure of from 13s. to 18s., according to the price and the nearness of obtainable fuel. Where a draught kiln is used and the fuel consists of coal, allow 10 cwt. for every 1,000 bricks. It is a common practice, and also an economical one, to burn a few roofing or draining tiles upon the top of the kiln of bricks.

Upon turning to "Laxton's Price Book" for 1878, I find the following figures quoted for bricks delivered on the works; and in another column I quote the prices of Pluckley goods put on rail at the Company's works.

Prices per 1,000—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Stourbridge Fire Brick ... | £7 | 0 | 0 | Pluckley Goods. | | | |
| Welsh do. ... | 6 | 5 | 0 | Blue Wire cut for Building | £2 | 10 | 0 |
| Newcastle do. ... | 6 | 5 | 0 | Blue Pressed Paving ... | 2 | 15 | 0 |
| Windsor do. ... | 6 | 0 | 0 | Do. Building ... | 3 | 0 | 0 |
| Best Malm Cutters ... | 7 | 15 | 0 | Do. Paving (any pattern) | 3 | 0 | 0 |
| White Cutters ... ... | 7 | 0 | 0 | Do. Paving, best .... | 3 | 5 | 0 |
| Second Malms .. ... | 4 | 10 | 0 | Do. Building do. ... | 3 | 5 | 0 |
| Paving Bricks ... ... | 4 | 0 | 0 | Red Paving Bricks ... | 2 | 5 | 0 |
| Gault Pressed Facings ... | 3 | 15 | 0 | Common Red Building Bricks | | | |
| Wire cut do. ... | 3 | 5 | 0 | from £1 15 0 to | 2 | 0 | 0 |

But my object in commencing the present paper was to describe more particularly the processes of manufacture as carried out by the Kent Brick, Tile, and Pottery Company upon their works at Pluckley Station. The clayfields now worked by this company were originally taken from Sir Edward C. Dering, Bart., by Mr. William Tongue, Builder and Contractor, of Plumstead, who opened the works and put down a considerable portion of the present extensive plant. But no sooner had the qualities of this clay for the manufacture of superior bricks and tiles and pottery goods generally, been properly tested and fully established, than the lessee applied for and obtained powers to form a limited liability company, to whom the lease of fifty years was eventually transferred. By this company the works have since been carried on under a Board of Directors, with Edwin Hughes, Esq., of Green's End, Woolwich, as Director, and Mr. Talfourd Hughes, as Secretary. Machinery of the most modern and improved kind has been introduced, illustrations of part of which are given in the present article; and the results have been in the highest degree satisfactory to the proprietor of the estate, the lessees of the works, and the shareholders of the company generally.

The machinery employed is driven by a steam engine of 35 nominal horse-power, having a 3 ft. length of stroke, and a flywheel 14 ft. in

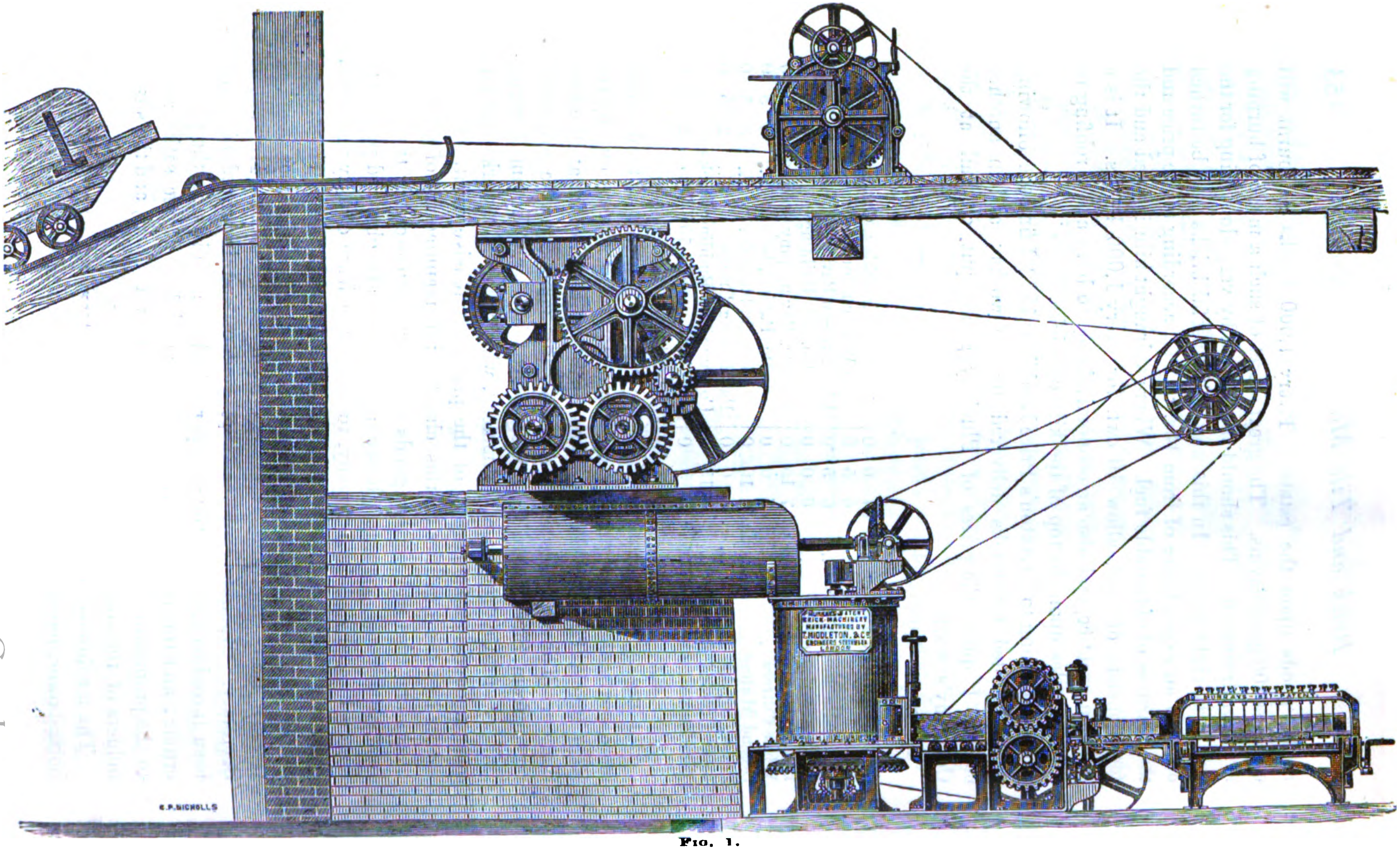

PATENT
BRICK MACHINERY
MANUFACTURED BY
T. MIDDLETON. & CO
ENGINEERS SOUTHWARK
LONDON
E.P. NICHOLLS

FIG. 1.

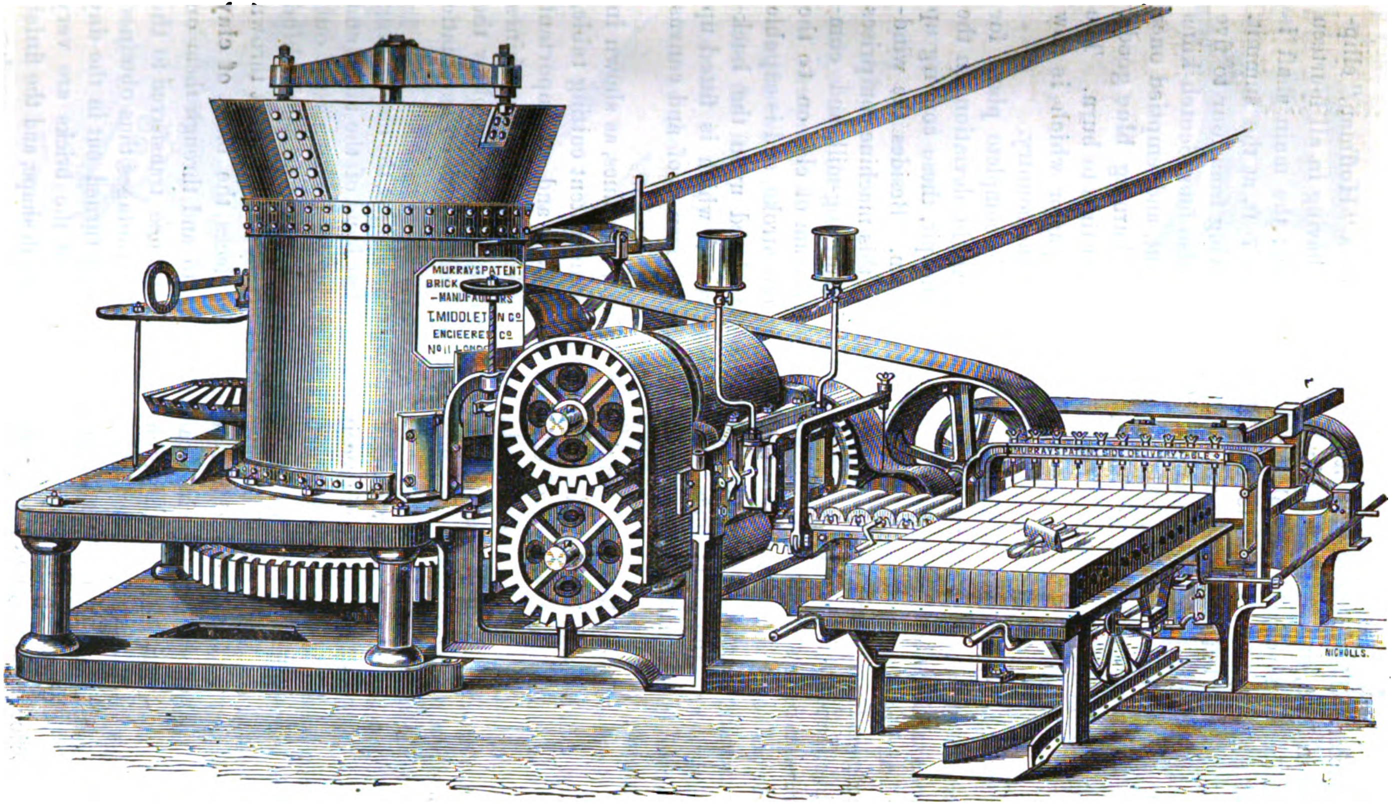

MURRAYSPATENT
BRICK
—MANUFACTURERS
T.MIDDLETON Co
ENGINEERS Co
No 11 LONDON
MURRAYSPATENT SIDE DELIVERY TABLE
NICHOLLS.

FIG. 2.

diameter. The kilns at present in use consist of a "Hoffman," elliptical in form, and 200 ft. long by 100 ft. broad, having in all fourteen chambers, and capable of holding 400,000 bricks; the main shaft is 150 ft. high, 14 ft. in diameter at the base, and 7 ft. at the summit. This kiln is burnt entirely round in periods varying from four to five weeks, according to circumstances. There are also four Scotch kilns taking 60,000 bricks each, which can be set, burnt, and emptied once in a fortnight; and four Staffordshire kilns for burning blue goods, which hold 30,000 each, and take rather a longer time to burn. The produce of these kilns is the celebrated blue pavior which is now being sent from Pluckley Station to all parts of the country.

The machine-house is fitted up with Murray's complete plant for permanent works as shown in Fig. 1, with a slight deviation in the mode of drawing the wagons of clay out of the pit, these coming up full and returning empty in a continuous stream. Besides the winding gear for drawing up the clay in tip-wagons, this machine comprises ribbed and plain crushing rollers, a mixing-pan, pug-mill, and compression rollers which send out a continuous stream of clay on to the side delivery table, which cuts ten bricks at one stroke, and is capable of turning out 25,000 per day. These are placed upon the hack-barrows and run off at once to the hack-ground, which is fitted up according to Kemsley's patent with corrugated iron roof and canvas curtains.

By the use of the patent continuous delivery machines, as shown in Fig. 2, fitted up with the lubricating solid die and patent cutting table, a non-intermittent stream of clay can be worked, and an important saving both of power and manual labour be effected. These machines are so easily fitted up that they can be removed so as to follow the position of the clay, and they may also be obtained with an automatic cutting-table.

By means of the improved brick-cutting table, Fig. 3, the clay issuing from the die of the machine is received on the left hand of the table, and when a sufficient length for from eight to twelve bricks has passed out, this is cut off, as it travels, by a single wire, and passed by hand behind the fixed cutting wires. The lever on the right hand is next thrown over and advances the thrust-plate, which places the block of clay parallel with the cutting wires, carrying it up to and through them on to a moveable board, with which they are at once transferred to the barrow without being handled. The chief advantages thus obtained are that from 2,000 to 3,000 more bricks can be turned out in the day by this avoidance of stoppages and waste, and the bricks are very superior in quality and mathematically accurate in shape, and the finish of the cut is perfectly clean, without the slightest tear or raggedness,

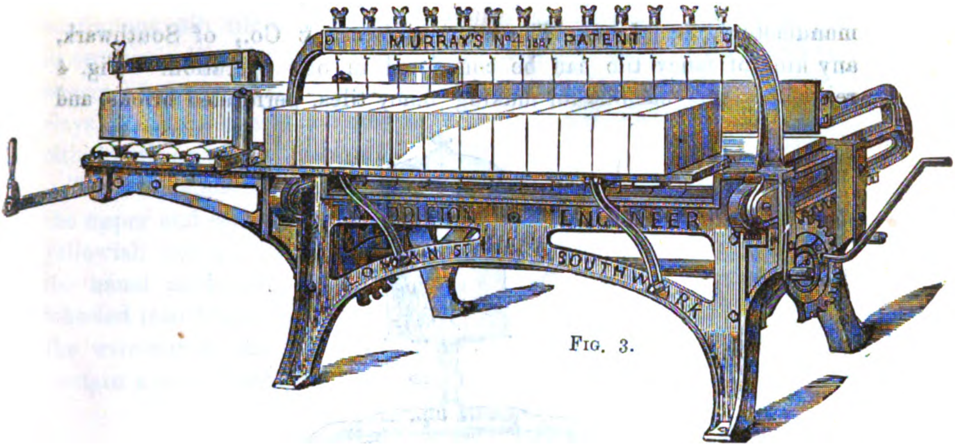


FIG. 3.

so that the value of the bricks for finished work is thereby considerably enhanced.

All tiles are moulded plain, and in the case of hips, valley, and ridge tiles the bend is given afterwards by placing them upon a horse of the proper shape. The corrugations of pantiles are imparted in a similar way. It is now customary to give each plain tile a couple of ribs for fixing it instead of perforating it and fixing with pegs as formerly. The nibs are put on by a separate operation in the press, but by the use of the patent Pipe and Tile Machine of Mr. Murray,

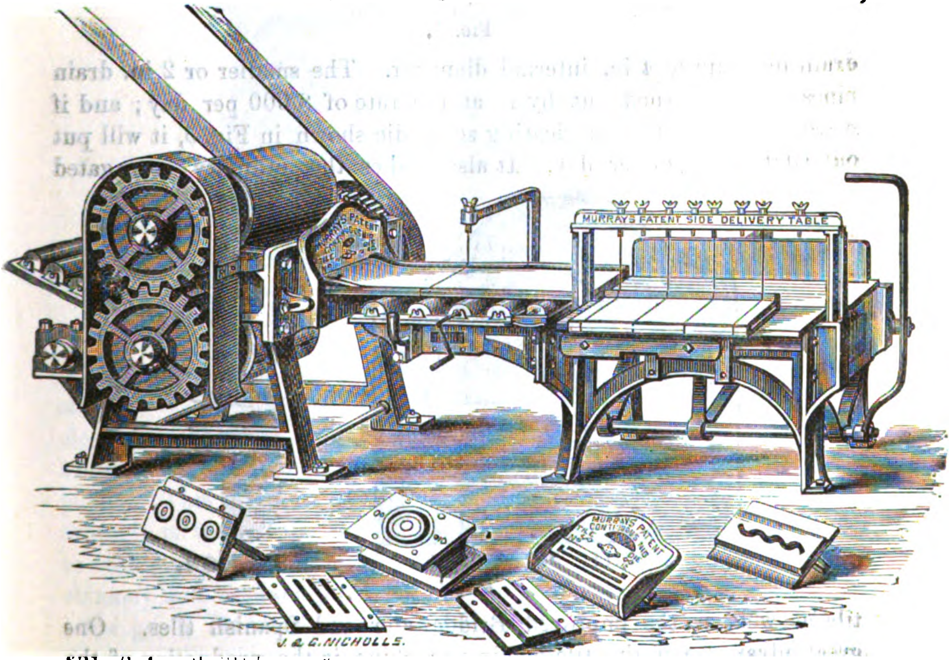
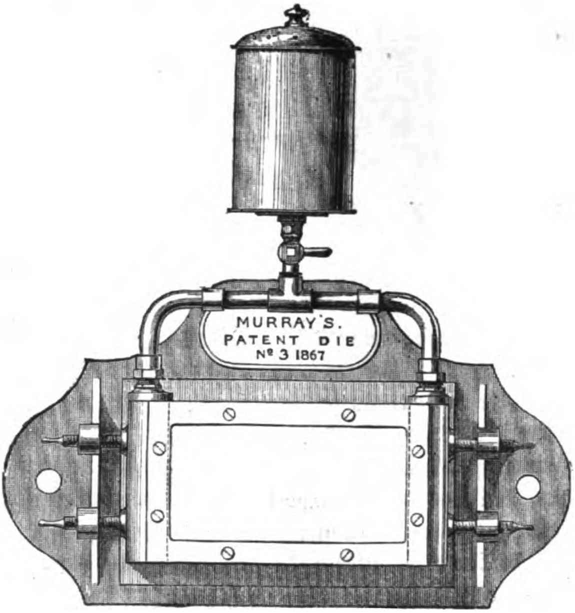
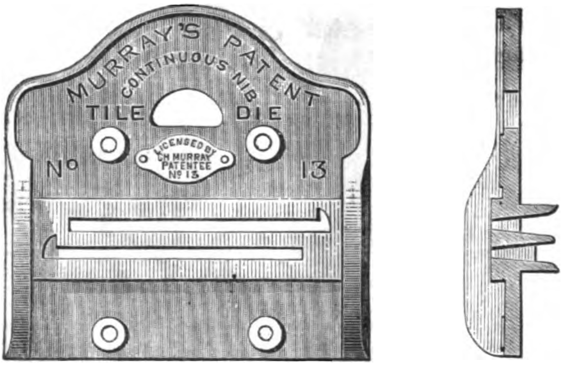

MURRAY'S PATENT SIDE DELIVERY TABLE
MURRAY'S PATENT
MURRAY'S PATENT CONTINUOUS TILE DIE
J. & G. NICHOLLS.

FIG. 4.

manufactured by Messrs. Thomas Middleton & Co., of Southwark, any kind of fancy tile can be completed in one operation. Fig. 4 represents this machine for making fancy tiles, perforated bricks, and drain pipes up to 4 in. internal diameter. The smaller or 2 in. drain pipes can be turned out by it at the rate of 8,000 per day; and if fitted with the patent lubricating solid die shown in Fig. 5, it will put out 10,000 bricks per day. It also makes the ordinary corrugated tile as well as the improved Bridgewater and Spanish tiles. One great advantage of the tile-making machine is the production of the



FRONT ELEVATION.
Fig. 5.



FRONT ELEVATION. SECTION.
Fig. 6.

continuous nib tile by the use of the die illustrated in elevation and in section in Fig. 6. By the use of the lubricating solid die a perfect stream of clay with sharp arris is obtained both from mild and strong clays. This die can be adapted to brick-making machines of all kinds, either with or without the cutting table.

The bricks and tiles intended for blue goods are manufactured from the upper and second beds of the clay, which are of a light fawn or yellowish colour. This is dug, watered, and weathered somewhat in the usual mode adopted in the manufacture of plastic clays, being wheeled into heaps and turned once or twice. From this is also made the wire-cut bricks and tiles of various kinds. Some of the layers contain a considerable amount of oxide of iron.

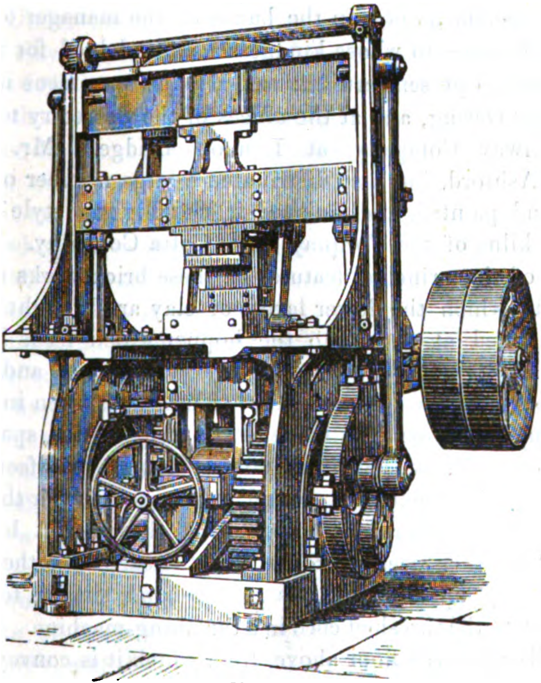


Fig. 7.

The pressing of chequered and other paving bricks, tiles, &c., and the manufacture of pottery-ware is carried on in a spacious enclosed drying shed, 168 feet long by 104 feet wide, the roof being boarded and tiled and properly ventilated, and supported by brick pillars. This shed is heated by under-ground flues, which convey through it the escape steam from the engine. In this shed is also to be seen a potter busily employed in turning out common flower-pots, chimney and seakale pots, jars, ornamental vases, and a variety of other goods for which the Pluckley clay is eminently adapted, but for the proper burning of which the company has at present no special kiln.

In the moulding of tiles of various kinds the finest sifted coal-dust is used. The stable paviors are at present pressed by hand in Dutton's lever press, which can also be used for tiles by simply changing the die. The tiles thus produced have, of course, to be horsed singly, an operation which is performed after they have lain two or three hours upon the hot floor. The shrinkage of this plastic clay is considerably more than that worked upon the semi-dry process, to be afterwards described.

The thorough adaptability of the Pluckley clay to the purposes of the potter has been proved by numerous experiments made all over England, by persons to whom samples of the raw clay have been sent. And its suitability to works of higher art, such as vases, statuary, &c., is shown by specimens now in the hands of the manager of the works—Mr. J. B. Porter—to whose kindness I am indebted for many of the facts stated in the present article; and also by specimens in the hands of Sir Edward Dering, and at the offices of the Secretary to the South-Eastern Railway Company, at London Bridge. Mr. Thompson, jeweller, of Ashford, has also distributed a large number of specimens both plain and painted, and finished in the highest style of art, and burnt in the kilns of the Torquay Terra Cotta Company.

But one of the principal features of these brick works is the semi-dry process by which the lower layers of clay are brought direct from the pit and tilted at once into the hopper which feeds Bradley and Craven's Clay-Grinding Mill, with revolving pan and perforated bottom. To ensure the continuance of this process, even in the wettest weather, a supply of dry clay is generally kept in the spacious room over the machine-house, which is 60 feet long by 40 feet wide. As soon as the clay is sufficiently ground, it passes through the bottom of the pan into a receiver, from which it is thrown out by automatic scrapers into another receiver, from which it is carried to the floor above by cups working upon an endless rubber-band, similar to those employed to elevate the threshed corn in a threshing-machine. The ground clay next falls upon the floor above, from which it is conveyed through canvas shoots to the pressing-machines working below. These machines, manufactured by Parker Brothers, are three in number, and each one is capable of turning out 50,000 bricks per week. Each machine produces very superior bricks, and delivers from one mould-box a much larger quantity in a given time than has yet been made by any other machine at present before the public. The superiority of quality lies in the fact that the brick itself undergoes a similar process to pugging within the mould-box in which it is pressed, and thus saves an intermediate process, which, as most brickmakers are well aware, is indispensable in all cases wherein the object mainly sought is a good ringing quality of brick, in place of the easily-disintegrated blocks, usually produced under the semi-dry system. If Chamberlain's Patent Appliance is worked in conjunction with the press designed by the patentee for the purpose of repressing the bricks as they are made by the machine, bricks are produced that cannot be distinguished from those made from plastic clay and repressed: these are facing-bricks of the very best quality. The machines under notice are simple, powerful, and not likely to get out of order: the bricks turned out are true in form, and sufficiently hard to go direct to the kiln. The quantity produced varies with different clays, but the limits lie between fourteen and twenty-three bricks per minute, and the power required for such a production is very small. An illustration of Chamberlain's Patent Brickmaking Machine is given in Fig. 7. Under the most favourable circumstances of grinding and delivery the clay is not more than from ten to fifteen minutes out of the pit before it is moulded, pressed, and stacked in the kiln. At this stage it has the appearance of a beautifully mottled marble slab.

As it leaves the canvas shoot the ground and finely granulated clay passes into a measuring box 9½″ × 8″ × 5″ in its internal dimensions. Each forward movement of this box deposits the contents in the die of the machine where it receives a pressure of thirty tons, and is by the next movement pushed forward upon the plate. Its size is now 9½″ × 4½″ × 3½″. A woman places it upon the press where it is subjected to a second pressure of about the same force as the former, and comes out measuring 9½″ × 4½″ × 2⅞″. A second woman removes it from the press to the hack-barrow, and it is at once delivered into the kiln, where its shrinkage in burning reduces it to 9″ × 4⅜″ × 2⅝″.

The principal kiln in use here is built in accordance with the invention of M. Hoffman, of Berlin, and patented in England by Mr. H. Chamberlain, a pottery engineer, who supplies the designs. It is elliptical in shape, having outside doors to each of the fourteen chambers, through which the bricks are wheeled in and out. The fuel, which consists of finely-sifted coal, is let in through apertures in the crown of the arch, and these are kept covered up with close-fitting iron caps. The smoke chamber surrounds the central chimney, and flues leading from the bed of the furnace communicate with this. The bricks are so packed that the fuel passes freely amongst them, firing as it descends. Between every two chambers is a large intercepting damper. When in full work, any of the two chambers may have their doors open at one time, the one being emptied and the other filled. Supposing No. I. is being filled and No. II. drawn; then the chambers III., IV., V., and VI., are gradually cooling, the first of these being the most advanced. The cold air which enters through I. and II. passes onwards until it reaches the burning ware in No. VII., and as soon as the proper heat is obtained this fires No. VIII. The next compartment will be nearly ready for firing, the following one in an advanced stage of drying off, and in this way the heat gradually decreases until it reaches the last chamber which is only recently stacked. The whole operations of drying off, burning, and cooling can be regulated with the greatest nicety by careful management of the dampers.

By the use of the Hoffman kiln all the gaseous substances set free by combustion are carried on by the current of air to dry out and prepare for burning the bricks in the further chambers. It is but seldom that anything. except a clear white smoke or vapour is seen issuing from the tall chimney, thus presenting a marked contrast to the Scotch and Staffordshire kilns, from which the densest rolling masses of black smoke may at all times be seen escaping. It should be stated that communication with the main chimney may be cut off from each flue by the use of iron bell-shaped covers.

The quantity of land at present leased by the Kent Brick and Tile Company is twenty-three acres, and they have power to add to this from time to time, as may be found necessary. But the probability of exhausting even this acreage is very remote, as the depth of clay is great, and some dug 50 feet below the surface has been found in every respect equal to the upper layers. The beds are quite impervious to water and so hard that blasting has to be resorted to for loosening the masses of clay. The weight of a cubic foot of this clay taken from one of the lower beds is precisely 120 lbs.

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PAI-CH'HA AS A SUBSTITUTE FOR BOXWOOD.—In the *Gardeners' Chronicle* for April 20, 1878, Mr. Jean van Volxem has drawn attention to a Chinese wood largely in use at Ningpo for wood-carving, and which he considers suitable for engraving purposes as a substitute for boxwood. Mr. W. M. Cooper, Her Majesty's Consul at Ningpo, has obligingly furnished me with the following information upon the subject:—"The tree and wood are common here; it is known as Pai-ch'ha (literally white tea or camellia). The Chinese language is a bad one for nomenclature, and the compound of two words has a different meaning to their primitives. The wood in universal use for book-blocks, wood-engravings, seals, &c., is that of the pear-tree, of which large quantities are grown in Shang-tung, and Shan-se especially. Pai-ch'ha is sometimes used as an indifferent substitute. Pai-ch'ha is a very white wood of fine fibre, without apparent grain, and cuts easily, is well suited for carved frames, cabinets, caskets, &c., of which large quantities are manufactured here for export. The tree itself resembles somewhat the *Stillingia*, but has a rougher bark, larger and thinner leaves, which are serrated at the edge, more delicate twigs, and is deciduous. Boxwood is known as Huangzang (literally yellow poplar). In the south of this province and Fuk-kien boxwood is grown principally for native furniture and export to Japan. It is prized on account of its durability and freedom from warping; it is sold by weight at prices varying from 3½ to 6 dollars (of 3*s.* 10*d.*) per picul of 133 lbs. English." Mr. Cooper sent fruits of the Pai-ch'ha, which proved to be those of an undescribed species of *Euonymus*.—*Kew Report.*

# The Top-Dressing of Coniferæ, and other Trees on Lawns and in Parks.

By D. T. FISH, Hardwicke Gardens, Bury St. Edmunds.

At various periods of my life I have had striking proofs of the beneficial effects of the practice of top-dressing, and in one or two cases equally or more striking examples of the evils of denuding the roots of any, even the smallest, portions of their surface soil. It is too often forgotten that the top-dressing of the roots of all trees is a natural operation. The natural fall of the leaf, the annual growth and decay of so many annual and other weeds and grasses, the excreta of birds and ruminants and other animals,—all tend to provide the roots of trees with surface dressings of greater or lesser depth and richness. The amount and quality of these natural dressings are also very apt to be underrated, though hardly any cultivator of trees can have failed to notice the slower rate of growth of trees in isolated positions on lawns or in parks to those in clumps and plantations. The one explanation generally given for the immense disparity has been exposure; shelter made the trees grow in the mass, the want of it checked growth in fields and on lawns. This, however, is but a part, and probably but the lesser part of the truth. The trees in the woods were top-dressed, those on lawns have been starved. The case is even worse than this. For not only have all natural top-dressings been removed from trees on lawns, but the root soil has been forced to form a green carpet, to please the eye at the expense of the roots. In this there is a compound impoverishment of the soil; it is robbed of its natural dressings, and an extra strain is laid on its strength to furnish a surface crop, the nett result too often being that the roots o the trees are half or wholly starved. This negative and positive impoverishment of root run is the too frequent cause of the weakly or unhealthy state of so many single trees found on lawns and in parks.

Nothing new is added for the roots to feed on, and the little food in the soil at starting has to be divided between the roots and the surface vegetation. The latter also at times grows so thick and dense as to become almost impervious to the passage of either air or water. When this happens, another starving element may be said to be added to those already in active operation; for the food of the plants may be said to be fixed in soils from which water and air are excluded. Roots are keen searchers out and consumers of food, nevertheless, they would starve in a dunghill itself from which air and moisture were excluded. These are nature's great solvents for the breaking down and due preparation of the plant food stored in the rough in the earth; they, as it were, liberate it, and transform and serve it in new states or conditions adapted to the tastes and powers of the plants. In a word, they change solid manure into liquids and gases, so that plants may absorb them, and convert them into the substance and products of trees, shrubs, fruits, and flowers.

This rendering of the surface of root runs more pervious to air and porous to water is one of the most potent though indirect benefits of top-dressings. It admits the exhausted crops to the food already existing in the soil, and they forthwith reduce, combine, flavour, and present the fixed food in forms absorbable and consumable by the roots.

The power of these two solvents explains the immense benefits that are sometimes derived from the mere breaking up of the surface over the roots, and the soaking of the root runs of trees with pure water. That alone, of course, exerts a most beneficial influence. Every root to the minutest fibre has its thirst quenched, its tissues filled to repletion. But the results of a single water dressing go far beyond this direct benefit, great as it may be; the water sets free all the food in the soil for the immediate feeding of the plants, most of this in many cases having been firmly locked up in the dry soil as in a vice, for dry earth is not only an excellent antiseptic, but a sure antisolvent. The roots of a tree in a dry soil may be surrounded with food on all sides without being able to absorb or eat a morsel of it; they are in as pitiable a condition as the crew of a ship on fire at sea, who see "water, water everywhere, but not a drop to drink." This artificial watering proves to the root what a heavy shower of rain would be to the thirst-stricken mariner; it might bring new life and safe deliverance,—it often has done. No one but those familiar with the intense hardness and dryness of the root runs of isolated trees on lawns and in parks can realize what a good soaking of water would be to many of them.

The insane practice, once so common, of planting almost every choice tree on a mound has aggravated and intensified all the evils arising from drought. The tops of trees shed off much of the water in any case, but when they are planted pretty closely together in plantations each tree waters its neighbour to a greater or lesser extent: thus all the roots get a fair share, and are tolerably well watered. But single trees shed their water right off the major portion of their roots; their greater perfection of top and denser and symmetrical heads render the water shed all the more perfect. This, aided by the raised mounds on which so many trees have been perched rather than planted, completes the dry state of the roots. Of course the drier the soil becomes the less permeable; hence root drought intensifies itself; dryness necessarily begetting more and yet greater dryness, until the parched starved roots too often become the prey of fungi, and the tree languishes and dies of sheer starvation.

And is this to be wondered at? The average rainfall of Great Britain is also too little to supply the water wants of many of our trees without our bringing our ingenuity to bear to devise artificial means by which the meagre portion of the natural supply shall be allowed to fall on to the roots and not be hurried off them as quickly as possible.

The best dressing for numbers of trees whose roots have hardly been wet for years is a liberal one of pure water that shall reach every root-fibre, and semisaturate the entire mass of soil that surrounds them. The breaking up of the surface of root runs likewise makes them permeable to rain, a portion of which will generally find its way to the roots through the thickest screen of foliage.

Top dressings of liquid manure are so potent and also so dangerous to many trees that they should never be given unless by the most skilful cultivators, and therefore possibly it will be safer to leave them entirely alone. Solid dressings of manure had also better be excluded, and never used unless by the most experienced gardeners or foresters. They may stimulate and revive trees in the most successful manner, and they may—in fact very often do—kill them in a very short time indeed.

The best and safest of all top-dressings for forest or other trees is one composed of turfy loam from the surface of an old pasture laid up to rot for two years before use. This is at once sweet, mellow and rich. It is better to add nothing to it; some are fond of leaf mould, and, at first sight, one might suppose nature's own top-dressing must be the best. But it should be borne in mind that the quality of leaf mould is very much modified by the mode of its preparation—and nature's method is not exactly ours. It is also most certain that as we make and use it it is generally more fertile of fungi than of root food, and these are always injurious to the roots of trees.

The loam is cleaner and in all respects better. It is also far more potent as well as more durable food. Experience is altogether in favour of it, but one great difficulty is, it cannot always be had.

In that case the soil out of an arable field or a kitchen garden proves a good substitute for the loam.

Opinions vary as to the best depth of top-dressings, but four inches may be accepted as a useful safe average. Two inches have had a marked effect, and a foot has been applied with the happiest results, without, as was expected at the time, any drawback from the excessive dressing. The best time for top-dressing trees on turf is a matter of importance. November is the best month in the twelve for the taking up and relaying of turf, and for the reason that it sooner gets together again into an unbroken carpet in November than if moved at any other season; consequently that is about the surest month for the top-dressing of trees on grass. One of the greatest benefits of the top-dressing consists in the retention for as long a time as fairly practicable of the water covering of closely knitted together turf impenetrable to air and water. Turf laid in February or March will hardly grow into its former compactness till the end of the summer, consequently those months should not be chosen for the top-dressing of trees on grass. Were the verdure under the trees not generally considered indispensable April or May would be the best. Nay, the root runs of the trees should be kept clear of grass altogether, so as to allow the rain and the air to exert their full solvent and enriching power on the top-dressings applied. But as this is often impracticable from an artistic point of view, the next best course is to move the turf late in the season so as to render it porous for several months. If the top-dressing varies in richness, the poorest should be reserved for the top, as this checks the growth of the surface herbage, and furnishes the roots with the richest food. The mode of dressing is extremely simple. The easiest plan is merely to remove the turf, apply the dressing, and replace the grass. Should the ground, however, be found very poor, dry and hard, the earth might be slightly disturbed or broken up, taking care, however, not to injure the roots; the mass of earth should then be well soaked and the dressing applied. It is a good plan also to trample or roll the earth pretty firmly down over the roots. The latter are some time in getting hold of fresh or loose earth. A certain amount of solidity is needful to enable roots to bite into or grip the fresh soil. As to the interval of time between successive dressings, that must be regulated by their depth, their richness, and the use the roots make of them. Once in three years is an excellent mean interval between the dressings, though an annual dressing would often prove the best of all. It is astonishing how soon roots spring up and utilize the surface soil laid over them. I have known cases in which heavy top-dressings of a foot or more have been permeated and filled with roots within eighteen months. The stimulating effects of top-dressings must be seen to be appreciated. They benefit all trees, but perhaps the fir tribe most of all.

The results, on such pines as Pinus excelsa, P. Macrocarpa, and P. pinaster; Abies cephalonica, A. Douglasii, A. pinsapo, and A. Nordmanniana; Cedrus atlantica, C. Deodara, and C. Lebani; and others, has been simply marvellous. Those that have got into a stunted condition have quickly recovered, and trees that were doing fairly well before have made double or treble growths after top-dressing. Neither need there be any fear of injuring the trees by earthing up their boles; there is no need to put much earth there, for that is just the place where fewest roots will be found, and besides, trees in vigorous growth seem to have the power of throwing their collars up as the roots multiply. Top-dressings waste rapidly; the three inches of one year dwindling down to one the next, and to nil the third, the soil itself seeming to disappear in its efforts to feed the hungry roots.

## THE WILD BIRD ACT AND THE FARMER.

THE fishermen have had their complaint of the destruction done to the fry by these wild birds, now the farmers are beginning to find out there is another disease as bad for them as the potato rot, and as difficult to get quit of, unless their landlords step in and use their influence in Parliament. Before the Act passed it was a rare thing to see a flock of geese or ducks flying through the air in their grotesque way; now it is nothing uncommon to see them in thousands flying from one feeding ground to another. During fresh weather in winter they frequent the high ground, feeding on the fry in the burns; but in frost they are seen in clouds flying to the estuaries to have their supper on the myriads of young smelts, herrings, and whitings, which they are known to eat in thousands, and breakfast early ere they leave for the farmers' wheat crops to digest the fry. Several lately shot had hundreds in their stomachs. In spring they again feed on the salmon fry, and to give them an appetite they go and feast themselves on the young grass, corn, wheat, barley, or beans, whatever comes handiest to them, and the loss to the farmer is beyond belief; so much so that many have to keep several boys puffing the powder away. One goose that was shot last spring had 420 beans in its stomach, another had 320 wheat, so if that is the way they dine, pity the poor farmers' crops! Last spring one goose had eaten in one day 57 young salmon; one duck, 27. This winter two geese had upwards of 350 salmon; one duck had 130 in its stomach. I really think it is time such gourmands were stopped in their rich feeding at the expense of the poor fisherman and farmer.—JOHN ANDERSON, in *Land and Water*.

# The Western Catalpa Tree

(*Catalpa bignonioides* var. *speciosa*).

This particular variety of the Catalpa appears to be the best variety for extensive planting in those countries where the climate and other circumstances are suitable for its healthy growth. All the evidence with which we are furnished by the eminent men who have thoroughly investigated the tree in its native habitat in the Western United States, and tested the usefulness and durability of its timber, conclusively prove it to be a most valuable tree to plant wherever the nature of things allows it to thrive, and there exists, or is likely to exist, a demand for its excellent and extremely durable timber. It seems to be peculiarly well adapted for introducing into our South African and Australian colonies, and in any arrangements made for the conservancy and extension of forests by the colonial Governments the merits of this tree should not be overlooked. Seeds of the true *speciosa* variety are now carefully collected in its native states by experienced men, and can easily be had through any reputable American seed merchant or nurseryman. The firm of Robert Douglas and Sons, of the Waukegan Nurseries, Illinois, U.S.A., have for some time devoted special attention to these trees, and have this season collected several hundred pounds of the seeds of the *speciosa* variety, an excellent sample of which they have obligingly forwarded to us, and from which are expected to be raised about two millions of plants, so that its merits may soon be fairly tested under almost every variety of circumstances, and its qualities fully developed under proper cultivation.

The above-mentioned nursery firm at Waukegan have forwarded to us a letter sent to them by the President of the American Forestry Association, Dr. J. A. Warder, from which we extract the following historical and descriptive account of this remarkable tree, the particulars of which must, we think, have a world-wide interest:—

The genus Catalpa was made by the botanist Jussieu; the species, *bignonioides*, by Walter. This native of Georgia and adjoining States has long been known in cultivation as an ornamental tree all along the Atlantic coast, as far as Massachusetts, and in some places it has become naturalized so as to spring up from self-sown seed. From the east it has been transplanted westward along the fortieth parallel of latitude, following the progressive settlement of the country, and has accommodated itself to the changes of soil and climate to a certain point, beyond which it is more or less affected by the winters.

Many years ago two trees were observed near Dayton, Ohio, that bloomed earlier and bore larger and more beautiful flowers than the others. They attracted the attention of Dr. J. Haines, who gathered their seed, and they were thus soon multiplied to such an extent as to become the summer glory of the streets of Dayton, and in 1853 this variety was named *speciosa* by Dr. John A. Warder, then the editor of the *Western Horticultural Review*, a magazine then published in Cincinnati, Ohio.

In 1825, in an address by General Harrison at our county agricultural fair at Carthage, the Catalpa was highly lauded, and the attention of farmers and others was forcibly directed to the importance of planting so valuable a tree. He referred to the Catalpa as he had seen it near Vincennes, Indiana, where he had resided as Governor of the North-western Territory.

At that period he may not have known the Eastern form of the tree, nor been aware that the kind he had introduced among us was at all peculiar, but he had learned from the French settlers there, and from his own observations also, that it was possessed of great value as an economical tree, on account of its wonderful durability. He had used it when residing on the banks of the Wabash, and posts of his planting are still doing good service; he found it sound in the stockades and dwellings of the old French town, which was a trading post in 1702, and quite a settlement in 1735.

General Harrison's trees, planted at North Bend, Ohio, were a source of great pleasure to him, and though now all destroyed, their self-sown progeny have sprung up around the old homestead, and others of his distribution are to be seen in the neighbourhood; but until recently they do not seem to have attracted the attention of botanists as being distinct from the Eastern trees commonly planted here.

As already stated, the distinctive characters of the Western tree were first pointed out and published in 1853, but under the supposition that this was only a variety, perhaps of limited range, for it could not be ascertained whence the two trees found by Dr. Haines had originated. Further observation has recently proved that they are of the Western form, and that this Catalpa is very distinct from the Eastern kind, and, indeed, it may be a different species.

This variety of Catalpa, now known as the *speciosa*, the Early Blooming, and towards the northern limit of its cultivation as the Hardy Catalpa, has its native habitat on the wet bottom lands of the Wabash and its tributary the White River, the Lower Ohio and its tributaries, the Little Wabash, the Cumberland, the Tennessee, and other streams. It is also found in the extensive swampy region of the Mississippi about New Madrid, in South-eastern Missouri and the adjoining portion of Arkansas, as well as in the neighbouring lowlands of the western portions of Kentucky and Tennessee, and on the Obion river.

In all this region of silty soil, a part of the great delta, the forests produce this particular Catalpa. It has also been found on the Red River, near the south-western portion of Arkansas, on the Arkansas river, at Little Rock, and probably on most of the tributaries of the Great River, to which, however, these recent special investigations have not been extended. In all the territory above indicated, and which has been critically explored, the *speciosa* Catalpa has been discovered in a state of nature; not one of the Georgia kind, the recognised type of the species *C. bignonioides* of Walter, has been seen, except where planted by the hand of man.

These must be given in popular rather than in botanical or scientific terms, and in words of comparison, to differentiate it from the kind so widely planted and so well known as is the species (the Georgia tree) which has been spread eastwardly from the Savannah to Cape Cod, and westwardly from the Hudson to the Republican Fork of the Kaw river, in Kansas.

The Western Catalpa may be thus diagnosed in detail :—

A tall and majestic tree in its native forests, sometimes reaching an immense size, with long stems and spreading tops, the limbs rather scattered, while the species often has short, leaning and crooked stems, and low, straggling branches, especially when standing alone, whereas the *speciosa*, in similar situations, is erect and taller, though pretty well furnished with branches; these, on account of the broad foliage, are, however, less numerous than in other kinds of trees.

The bark is very characteristic, being snug and compact, moderately thick, and furrowed longitudinally, not disposed to scale off in thin plates, as that of the species does after it has grown a few years, say ten or twelve; though it is true a few loosened scales may be seen on the bark of some old trees of the *speciosa*, particularly where it is crowded at the points of branching of large limbs.

Though perhaps unworthy of consideration as botanical characters, these peculiarities will be appreciated by the practical forester, and valued as important elements in his stock of wood-lore. His knowledge of trees is often brought into requisition, and he is required to identify them when the higher and more precise means of a botanical diagnosis afforded by the foliage, the inflorescence and the fructification are all a wanting, and he is thrown back upon the more general characters of the form or habit, the arrangement of the buds, or the phyllotaxy, the appearance of the bark, and even the colour and grain of the wood itself.

The flowers of the *speciosa* are much larger, and the colour of the bell-shaped corolla is a purer white; the internal markings of purple and yellow are also more distinct. The blossoms open from two to three weeks sooner than those of the Eastern kind, which have also a violet tint pervading the white of the corolla. As a merely ornamental plant the *speciosa* is superior in bloom as well as in habit of the tree.

The fruit pods, often called Indian beans, vary in size and length on trees of either kind, but those of the Western tree may attain the extreme length of twenty-four inches, and they are of a different shape when examined on the cross section. This is cylindrical, while that of the Georgia kind is elliptic; the valves meeting form an angle, and their margins project so as to be perceptibly felt as a ridge when the fruit is rolled or drawn between the thumb and fingers. The pods of the *speciosa* are usually of a dark brown colour, and the valves are marked externally by parallel grooves that extend to their entire length. Those of the species, as in cultivation, are usually of a lighter colour (rusty brown), and less distinctly grooved, in some scarcely indented by shorter channels.

The distinctive characters derived from the curiously winged seeds are the most reliable and constant, especially the arrangement of the margins and terminations of the wing or projecting membrane. In size the seeds of the *speciosa* exceed the type in length, breadth, and weight.[*] The *coma* or tuft of hairs at each end of the seed of the species is compressed and pointed, as though it had been wetted and drawn together, while in the Western kind they are separate, parallel, and almost digitate.

The colour of the membrane is also lighter in the Eastern kind, and the texture firmer and more satiny, while that of the Western kind is softer and more silky. These distinctions were first pointed out by the practical seed-handler, Mr. Robert Douglas, of the Waukegan nurseries, in Illinois, whose acumen as a judge of tree seeds is remarkable, and the result of long experience and close scrutiny, particularly of the seeds of Coniferæ.

The characteristic hardiness of the tree is of the greatest importance to the practical and extensive tree planter, for though we may be willing to put up with a so-called half-hardy tree upon the lawn or in the ornamental plantation, on account of its beauty or rarity, the forester cannot afford to run any risks, and should only select such trees for his economical groves as have an unquestionable record in this particular.

An approximate limit to the northerly range of these plants is all that can now be attempted, and many exceptional cases may be cited where individuals have escaped injury from frost even beyond the limits that will be indicated.

In Eastern Massachusetts there are old trees of the common kind that have stood for seventy-five, or perhaps one hundred years; and yet Professor C. S. Sargent, who kindly reported them, says that he "cannot recommend it as a forest tree for that region, except in sheltered situations, because it does not always perfectly ripen its fruit," which he very properly considers a safe test.

The Western kind has a few representatives about Falmouth, in Barnstable county, in the same State, as reported by the successful tree planter, Jos. S. Fay, of Wood's Hall, Mass.

Westward from the Alleghanies the safe limit comes down to a lower range, as will be indicated by a few citations. At Toledo, Ohio, latitude

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[*] Twenty-five seeds Speciosa (from Vincennes) 11 = grs.

[†] Twenty-five seeds Georgia (from Terre Haute) = 9 grs.

41, it is sometimes cut to the ground, and even at Dayton young trees of the common kind often suffer from the cold. In Michigan they generally suffer; at Fort Wayne, Ind., in all Northern Illinois, above La Salle, in Wisconsin, in Nebraska, and in Kansas north of the Kaw river, and in all Iowa it is considered tender, and it has been damaged occasionally even at St. Louis, Missouri, in latitude 38·37 N. In all this region, wherever the Eastern form has been introduced, it has been found more or less tender, and young plants are often cut to the ground. Therefore the extensive planting of this tree, the type of the species, cannot be urged anywhere beyond the fortieth parallel north.

The typical tree planted in France has suffered from frost in Paris, but succeeds on the shores of the Mediterranean, and also lives at Vienna, Austria. In Great Britain it has attained large proportions in the south of England, blooming in July and August about London, but not perfecting its seed satisfactorily. According to Loudon it becomes almost an herbaceous plant in Scotland, and requires a greenhouse at St. Petersburg.

In its Western form, whether this be a mere variety or a true species, the Catalpa is sufficiently hardy to be planted north of latitude 42—even on the bleak prairies of Iowa and Nebraska. A few trees have been grown in Massachusetts, near a stormy coast. It adorns the streets of Columbus, Dayton, and other towns in Ohio, as at Indianapolis, Terre Haute, and even at Fort Wayne, Indiana. It lives on dry, sandy land at Ypsilanti, Michigan, and at Waukegan, on Lake Michigan, in the north-east corner of Illinois, and thrives nobly at Princeton and other points of Northern Illinois, where the Eastern form has suffered; so does it survive and flourish at Muscatine, and other parts of South-eastern Iowa, and is reported hardy even above latitude 42°, and is found in Omaha, and the corresponding quarter of Nebraska, in all of which the normal type is tender, or at best but half hardy, even under the more favourable conditions of shelter.

In very early times the French settlers on the Wabash had gathered the information respecting this Western Catalpa from the Indians, which it has taken the intelligent American citizen nearly two centuries to acquire. They learned that its timber possessed exceedingly valuable properties. The aborigines had found it easily worked, even with their imperfect tools. They appreciated its lightness and strength in the construction of their canoes, which enabled them to effect the portages from one stream to another. They found it durable where it had fallen across a stream and formed a natural bridge, of which an old Indian is reported to have said, "My father's father crossed on that log," giving it a duration on the ground without decay of more than four generations, or more than a century. The French were not slow to act upon the hint, and used it in the construction of their stockade and their habitations, which General Harrison found in a good state of preservation. He also applied the timber to economical purposes, and urged the cultivation of the tree. Posts of his planting about the Governor's residence at Vincennes are still in use, and likely to remain sound for a long time.

It is believed that all Catalpa timber is durable ; but heretofore the trees have been planted solely for ornament, and the habit or form of the kind selected was a matter of less moment than if looking to the economical application of the timber. Still, here and there instances may be found where the common Catalpa has been used chiefly as fence-posts, which have stood well. But in the Western forests its great value has been so fully appreciated by the early settlers and their successors that the timber has now become quite scarce in all accessible places, where, indeed, it has to be watched to prevent depredation. It is largely applied for fencing, and as supports under the corners of buildings, for bridge timbers, and other purposes where strength, durability, and lightness are required, such as the sheathing and frames of small boats or skiffs.

The wood also works easily under the tools of the joiner, and when well seasoned is very desirable for the inside finish of houses ; in its tint and grain it compares favourably with some of our finest native ornamental woods. One of its most promising applications, on account of its durability, its peculiar constitution, presently to be mentioned, and the brief period required to bring it to a useful size, is that of material for railway sleepers or cross-ties. For this purpose trees of twenty-five to thirty years' growth are large enough to yield four or five ties.

The peculiarity of the wood's growth just now referred to is this : the exceedingly and unusually small proportion of alburnum or sap wood, that part of all trees which is most prone to decay, is here reduced to the minimum; hence quite small trees, and even limbs, used as vine props and as fence stakes, have been found to last a long time. In making cross-ties great economy may be practised with this tree, because a log of twelve inches, instead of being hewed into one piece, may be sawed into two, that will have a wider bearing for the rail, while at the same time the convex side, being next the road-bed, is more readily fixed by tamping than if it had been sawed or hewed to a flat surface. The engineers who have used this timber in railway construction speak very highly of it, and say that it holds the spike sufficiently well.

Many instances are known of the great durability of the Catalpa, even where exposed to alternations of wet and dry, and to the action of the elements. The wood fibre seems to resist decay in a wonderful degree; logs that have lain upon the ground for a hundred years are still sound, and when sawed up the lumber is free from rot, and will take a pretty good polish. Fence-posts that have done good service for half a century, and in one case for three quarters of that period, have been taken up in good condition, and have been cut up and finished as specimens for distribution by Mr. E. E. Barney, of Dayton, Ohio, to whom belongs, indeed, the credit of now bringing this valuable tree before the public—an act of disinterested kindness to his countrymen which is deserving of all praise.

The marvellous stories, heretofore looked upon as travellers' tales, respecting the durability of the trees near New Madrid, killed by the earthquake of 1811, have recently been verified by ocular demonstration. In the portions of the forest that were then submerged, and covered with water from three to ten feet deep, the dead Catalpa trunks are still standing, but they stand alone; every other tree of the sunken forest has decayed and fallen, leaving these remains still standing in the water, and presenting the appearance of some strength. Specimens have been secured for Mr. Barney, who will subject them to physical tests, and report the results in his forthcoming pamphlet.

Of the railway that passes through this region a portion had been laid with Catalpa ties, and has been in daily use for eleven years. These are still sound, while the oak ties beside them have been twice replaced. They are laid upon the silty mud of that low bottom land, subject to overflow, and with no gravel or metal for tamping, consequently they can never be absolutely dry. Indeed, one very intelligent observer in Southern Illinois, where this tree is native, asserts that posts seem to last longer in wet places than in drier soils.

The sum of this paper is that we have two distinct Catalpa trees in the United States, one of which, the subject of this article, is of Western origin, is a finer tree and more hardy, and therefore better adapted to forest planting, and may be safely planted over a wider range of territory.

## FROZEN BARK.

Complaints of admixture of frozen with sound bark in the market appear to be common in France just now. Much of the damaged bark strips well, and outwardly looks all right, but the interior is found to be blackened and dead. M. Achille Muntz, the analyst to the Conservatoire des Arts et Métiers at Paris, has made the following comparative analysis of frozen and sound oak bark:—

| | Frozen. | Sound. |
|---|---|---|
| Tannin | 4·05 | 6·93 |
| Extractive matters | 4·15 | 4·75 |
| Ligneous do. | 85·34 | 79·30 |
| Water | 6·45 | 9 02 |

The frozen bark thus contains a much smaller percentage of tannin than sound, healthy bark, and the value for industrial purposes is farther diminished by the fact, that this decrease is attended by a corresponding increase in the proportion of obnoxious colouring matters in the bark. This, in M. Muntz's opinion, is not the immediate result of congelation, but is due to incipient decomposition, which naturally follows the death of the bark.

# Edinburgh Botanical Society.

## EXACT MEASUREMENT OF TREES.

At the last meeting of the Edinburgh Botanical Society Sir Robert Christison, Bart., intimated that Captain Wood, of the Cudh Forest Conservancy had instituted an inquiry on the exact measurement of trees on the lines indicated in Sir Robert's papers to the society. The surbordinate officers had been furnished with copies of directions for doing this, and a plot of a quarter of an acre, duly trenched all round, was to be set apart as an experimental station in each forest district. In each such plot the trees were to be cut down, or planted, so that each tree fixed on for observation shall be fifteen feet distant from every other. Directions are also given for numbering the trees, and tabulating the results, and the requisite instruments are supplied by the Conservancy Establishment. Lastly, instructions are added for noting all peculiarities of soil, climate, elevation, exposure, and treatment. This Indian experiment should incite all tree culturists to do likewise.

At the same meeting Sir Robert exhibited a magnificent section of an oak, 145 years old, felled in the spring of 1879 at Cammo, which Alexander Campbell, Esq., had presented to the Museum. It had been cut at two feet from the roots; and the centre was considerably decayed for two feet nearly. The longest diameter of the wood measures 37·4 inches; transverse, 35·0; long radius of that diameter, 19·8 inches; short, 17·6; girth over bark, nine feet three and a half inches. Sir Robert has appended a neat scale, one-half the natural dimensions, showing the relative width of the annual layers of one diameter by decades of years. The rate of growth is worth studying. At forty years the layers on both sides are nearly equal, but at sixty years marked for the right hand scale the layers on the left show ninety years; while at one hundred years on the right, the last have nearly passed the age limits of the trunk.

Amongst several reports on the effect of the last winter on vegetation presented to the meeting by Mr. Sadler, some from the Kelso district were particularly noteworthy and interesting to foresters. Thus at Ormiston, in the lower valley of the Teviot, the thermometer registered on the night of the 4th December 18 degrees below zero.

This summer no flowering tree but the rowan, or mountain ash, had blossomed there. A fell destruction had marked this well-wooded district of southern Scotland. Mr. Buchan told how a reading of 16 degrees below zero had been taken at Springwood Park, Kelso, during last winter. This was lower than that reported from Ormiston, which was obtained on an exposed thermometer, while at Kelso the instrument was protected. The marked fatality to tree life might be explained from a beautiful autumn having succeeded the sunless summer of 1878 in this part of the country, thus causing an abnormal growth of wood at a late season of the year. The severe frosts of 1879-80 thus found easy prey on which to havoc, so that even the sturdy oaks, in some parts of that district, have succumbed to the unusual rigour of last winter. The list of trees and shrubs killed outright, or cut to the ground, is quite unprecedented in the border counties of Berwick and Roxburgh.

## OUR FOREIGN EXCHANGES.

There have been received from Bohemia *Haj* No. 5; *Domacnost*, No. 5; *Lovena*, No. 5; from Austria, *Oesterreichische Gartenlaube*, Nos. 17, 18; and *Handelsblatt*, Nos. 22, 23; and from France, *Revue des Eaux et Forêts*, No. 6; from Italy, *Nuovo Rivista Forestale*, No. 3; and from Spain, *Revista de Montes*, No. 81.

In the *Revista* is a paper on "Vegetable Fuel," by D. Carlos Castel; a paper on the migration of animals in the Gulf, and *Saragassum bacciferum*, a seaweed covering extensive areas of the Atlantic on the Southern edge of the Gulf Stream, by D. Maxlaguna; and an account of the Prussian School of Forestry at Neustadt-Eberswalde, a corresponding account of which prepared by us after visiting the institution is forthcoming whenever it may be required. The *Nuovo Rivista* of Italy is taken up entirely with continuations of papers previously appearing on Tannin, and on the relief of forests from existing servitudes. In the *Revue des Eaux et Forêts* appears a concise account by M. A. Gurnaud of the progress of forest economy in France during the last 400 years, a translation of which is forthcoming when required. M. Gurnand has in previous issues written largely of existing methods of forest management in scientific and professional phraseology. In this article he supplements his previous papers with a more popular narration of the progressive advances by which the scientific forestry of the present day has been reached.

John C. Brown.

# Queensland Forest Produce.

By D. SYM SCOTT, Ballinacourte, Tipperary.

In a report of the Brisbane Botanic Gardens drawn up and presented to both Houses of Parliament by Walter Hill, Esq., Colonial Botanist and Director, by whose courtesy I am favoured with a copy, I glean from the paragraphs referring to the forest produce in the colony that there are no conservatory restrictions imposed on what may be termed timber reserves. In Queensland, as well as elsewhere, there seems to be one uniform system of clearing, and no attempt at reproducing. The result of this indiscriminate cutting and reckless waste of timber is, according to Mr. Hill's able and lucid report, soon to be felt in the country, and he gives the Legislature some well-seasoned, appropriate, and practical hints, which, if acted upon, will conserve to the colony an adequate supply of suitable timber for building and commercial purposes. What Mr. Hill in his report recommends to the Government of Queensland is applicable to all British colonies. In an early number of the Journal I touched upon the same ground, and from what I have heard since of forest conservancy abroad, something akin to my suggestion is likely to be adopted. What I then and still urge upon those having the control of timber reserves is to inaugurate State regulations respecting the conservancy of State forests, so that a permanent supply could be depended on. If the timber limits were arranged into blocks of sufficient extent (and in every country with tracks of virgin forest, this would be a simple process, without interfering with the rights and privileges of the subject of the realm), these blocks could then be operated on alternately, keeping up a rotundity system of reproduction. By this process the crop could be changed when deemed necessary through the soil becoming impoverished by a series of crops of the same kind. When such took place hard wood would succeed Coniferæ and *vice versa*. When a portion of, or an entire block was cleared, suitable places in it could be trenched and converted into nurseries, where plants could be reared to replant the ground. This I consider a better system than the practice at home of established nurseries. If seed were sown soon after the timber was cleared, there could be an ample supply of suitable plants adapted to their permanent soil, and less likely to be affected by situation or climatic influence. The system I am here urging cannot be adopted without the assistance of skilled labour; but this would be the consummation of what I have all along in the Journal been advocating. Unless experienced men were employed every system would prove abortive, failure would succeed failure, and the Legislature get discouraged. But, on the other hand, were such works placed under thorough practical supervision they would prove most recuperative to any State for domestic, commercial, and maritime purposes. No country possesses better facilities for conserving a permanent supply of timber than Queensland. Having an area of 700,000 square miles, with a mountain axis, extending from the extreme south, parallel with the eastern coast, to nearly its most northern point, with another striking off at right angles in a western direction, the base of these two watersheds is well adapted for State forests, the only drawback being the means of transit; but the whole country is drained by ample river system for the floating of timber or the construction of canals. It is astonishing that Canada is not more energetic in this respect. She evidently imagines the supply inexhaustible, but from gentlemen well acquainted with the annual "cut" we are informed that half a century will see all the white pine growing east of the Rocky Mountains "cleared." It ought to be a law strictly enforced in every state, that timber of consecutive growth be conserved under State supervision. I make the foregoing remark because I believe a wide field will soon be opened in our colonies for our young foresters.

## SALE OF TIMBER, BLACKRINDS, FAGGOTS, &c., UPON THE SURRENDEN-DERING ESTATE.

The annual sale of oak and ash timber, blackrinds, and faggots upon the estate of Sir Edward C. Dering, Bart., of Surrenden-Dering, in Kent, was held by Messrs. Bayley & Son, of Ashford, on Thursday last, the 24th June. The oak offered this year was mostly of small size, consisting principally of thinnings from Dering Wood, in the Weald of Kent. The competition was, however, as brisk as usual, and the following prices were realized:—

Oak Timber from 11d. to 2s. 2d. per foot: average 1s. 6½d. per ft.
Ash ,, 2s. 3d. to 3s. 2d. ,, ,, 2s. 8d. per ft.
Blackrinds ,, 10d. to 6s. 6d. each ,, 2s. 7d. each.
Faggots ,, 20s. to 29s. per 100: average 26s. 8d. per 100.

A. J. B.

# Powis Castle, Montgomeryshire.

## THE SEAT OF THE EARL OF POWIS.

This ancient seat of the Earl of Powis stands on a commanding site, about a mile to the south of Welshpool. It was founded in 1109, by Cadwgan Ap Bleddyn, Prince of Powisland, an ancient Welsh territory, extending from the Severn to the Wye, including parts of the present counties of Salop, Hereford and Worcester. In Welsh, it bears the name of Castell Coch, or the "Red Castle," from its site on the top of a red sandstone rock. The grounds around it were laid out by "Capability Brown," but have been since much improved, and contain many very fine old trees, as well as a good collection of the newer and rarer ones. An interesting description of the grounds and gardens recently appeared in the *Gardener's Chronicle*, accompanied by an excellent engraving of the Castle, from which we make the following extracts:—

"Powis Castle is approached by a well-kept drive from the town of Welshpool, and traverses an extensive and beautifully undulating well-wooded park, where some of the finest oaks in Wales are to be seen. The views from the drive and private walks are grand. A fine collection of the various acers, poplars, and other choice conifers, grow in great luxuriance, showing how well they do on the rocks. The hawthorns of different varieties in their season must be quite a sight to see, and are highly appreciated by the visitors from Welshpool and the neighbourhood, who come in great numbers to see them. We understand that the park is never closed, and that the public are allowed to walk into the Castle court (south front), whence they can get a good view of the terraces below and the surrounding country.

"Leaving the Castle by the tower doors there is a splendid view of Welshpool, and passing on to the Dial Terrace you get charming views of the Moel-y-Golfa and Breidden Hills, and of Montgomery Castle, eight miles distant. Taking the first flight of steps down, you are on the top terrace, where the flower beds and borders are in the mixed style—rhododendrons, clumps of Pampas grass, tree pæonies, tritomas, &c., and where you meet with those fine yews which give such a character to the Castle. We also noticed here two fine balloons, seven feet high and about five feet through, covered in fine bloom with *Clematis Jackmanii.*

"Passing down to the Aviary Terrace, to the left, the visitor comes upon the principal peach wall, on which are some fine trees of Royal George and Bellegarde, carrying a nice crop of fruit.

"Passing on to the right by the aviary, the wall is covered with clematis and other creepers mixed with fine trees of Beurré, Clairgeau, Easter Beurré, and Passe Colmar pears, having good crops of fine fruit for the season. Along the border in front are some pretty alpine and herbaceous plants, but too numerous to mention. Passing down more steps, a large half-span-roofed house is reached, filled with large ferns, eucharis, and a good collection of named amaryllis. These plants are transferred to the forcing-houses in September to make room for the bedding plants, which are kept here till spring. The visitor next passes along the Greenhouse Terrace, where a good lóng view of the borders is obtained, consisting principally of a grand collection of herbaceous plants, interspersed here and there with beds of pelargoniums, fuchsias, gladioli, coleus, alternantheras, &c., with just a little of the carpet bedding to give variety. In the centre of this terrace stands the greenhouse (or orangery), where there is a fine collection of large camellias in tubs, clethras, and other plants; and we were given to understand that they had flowered most profusely in the spring, and though there had not been a spark of fire in the house all the winter, they appeared to be in robust health. Leaving this house we pass the rose border and more trained clematises, which are quite a telling feature at this place, coming in so well with the fine Irish yews, Thujopsis, and other shrubs. The roses being late this year, we found them in great beauty, and showing that they are quite at home.

"How very interesting these terraces must be at any season of the year!—every step one takes there is some pet to admire, from the pæonies to the irises, which are quite giants of plants, and which on the whole are seen to such advantage rom the Castle windows. The next, or Lower Terrace, consists chiefly of fruit trees, the walls being planted with plums, apricots, and pears.

"Passing down the slope walk we again get some fine views, including Leighton Hall and other pretty bits. From this point the kitchen garden and forcing-houses are overlooked, but they are not very extensive for such an establishment. The glass consists of three vineries, one peach-house, in one range, facing east, with seven span-roofed houses and pits for pines, stove and greenhouse plants, cucumber and melon growing; and at the back of the vineries, but facing south, is an addition of two small new houses and pits, one house for pot vines, and the others for strawberries and beans, the pits for forcing purposes.

"Entering now the Alcove Walk we find ourselves under some fine old elms engrafted on each other across the walk, the trees providing a fine shelter for the terraces and Castle from the east winds, but, unfortunately, too shady for the kitchen gardens. Beginning to ascend again, we enter the Wilderness, and find some beautiful trees to admire, with glimpses of the Castle and terraces. The American garden is here, and must be a charming sight in its season, with rhododendrons, azaleas, &c. This must indeed be a pleasant retreat in summer time, with the fine American and Turkey oaks and other giants of the forest overhanging you, and the beautiful ferns and rhododendrons for the undergrowth. At the end of the Wilderness we came upon the young ladies' gardens, with a pretty summer-house and grotto; and this walk takes us back to the south front of the Castle. The enclosed paddock below contains the fat deer which are daily fed here, and which give quite a charm to the grounds.

"One more feature about this noble place and we have done—that is, the holly and yew hedges; they are green walls, and worth a journey to see. They are several miles in length, and Lord Powis takes great interest in them, as also in ornamenting his beautiful park with choice and rare trees from all parts. The young oaks grow up more like larch than anything, they are so straight, to say nothing of the beautiful effect they give the landscape and good taste in their arrangement for effect."—X.

## CEDRUS ATLANTICA.

Was this plant known to the Romans? In the postscript of a letter from J. Evelyn to Samuel Pepys, dated Sayes Court, August 10, 1683, there occurs the following passage relative to Lord Dartmouth's expedition to Tangiers:—"I am sure you cannot but be curious (among other things) to enquire of *medals* and *inscriptions*, especially what may be found about old Tangier, &c. Mr. Sheeres will remember also *the poor Gardener*, if he happen on any kernels or seeds of such trees or plants (especially ever-greenes) as grow about those precincts. Were it not possible to discover whither any of those *Citrine*-trees are yet to be found, that of old grew about the foote of *Mount Atlas* not far from *Tingis*, and were heretofore *in deliciis* for their politure and natural maculations to that degree, as to be sold for their weight in gold? Cicero had a table that cost him ten thousand sesterces, and another, which I have read of that was valued at 140,000 H.S., which at 3*d*. H.S. amounted to a pretty sum; and one of the Ptolomies had yet another of far greater price, insomuch as when they used to reproach their wives for their luxury and excess in pearle and paint, they would retort and *turn the tables* on their husbands. Now for that some copies in Pliny reade *cedria*, others *citria*, 'twould be enquired what sort of Cedar (if any) grows about that mountaine."

On referring to Dr. Middleton's *Life of Cicero*, I find—"There was a Cedar table of his remaining in Pliny's time, said to be the first which was ever seen in Rome, and to have cost him £30." "Extat hodie M. Ciceronis in illa paupertate et quod magis mirum est, illo ævo empta H.S. x. [Plin. *Hist. Nat.*, xiii. 15.] nullius ante Ciceronianam vetustior memoria est." *(Ibid.* 16.*)* Was the wood referred to Cedar? and if so, was it *Cedrus Libani*, *C. atlantica* or *C. Deodara*?—S. P. Oliver, Capt.

[One such table was valued at about £9,000, while still more fabulous prices are recorded as having been paid for them. Horace suggested the employment of the wood in the construction of a temple to enshrine a marble statue of Venus:—

> "Albanus prope te lacus
> Ponet marmorean sub trabe citrea."

and Petronius Arbiter, in descanting on the luxury of the Romans, seems to represent it as worth more than its weight in gold. Daubeny, from whose essay on the trees and shrubs of the ancients we take the above, concludes that the tree which furnished this material was what is now known as *Thuja articulata*, or *Callitris quadrivalis*, a tree which is found at present in Algeria, and which furnished beautiful specimens of cabinet work to one of the great exhibitions (1855) in Paris.—Eds.] *Gardener's Chronicle*

## ENGLAND.

NOTWITHSTANDING the protracted season of bark-stripping, the produce of the falls has been delivered in the finest possible condition for the purposes of the tanner, and the greatest satisfaction with the result is expressed on all sides. A little higher price would have been more in accordance with the extent of the supply throughout this district. £4 10s. per ton delivered to rail has been the average price.

The woods are for the most part cleared, as the fall has been by no means a heavy one.

Pruning has already commenced in some places. Many of our forest trees, and more especially plantations of larch, have not even yet recovered from the effects of the cold easterly winds of May; and during the present month much injury has been done to chestnut and ash upon low-lying and wet grounds, where last year's shoots were unripened. Great havoc has also been made among transplants removed in the winter and the early spring.

Steam-cultivation, trenching, and hole-digging for the work of the next planting season may now be commenced, and draining and fencing pushed forward. The cartage of all heavy materials can now be done upon the land with the smallest amount of labour for the horses.

Bud pink hawthorn and horse-chestnut in the woodlands upon the last year's shoots, and attend to early grafts. Bud upon stocks somewhat in advance of those from which the buds are taken.

Ornamental hedges, such as laurel and yew, may now be carefully trimmed with the pruning knife.

As the weather gets hot and the cattle are tormented by flies in the pastures, all wood hedges should be kept in good repair, or th cattle will seek the denser shade of the woodlands.

In the nursery prune up strong plants in the lines, thus preparing them for autumn removal; hoe continually among the young plants and green crops, and water seed-beds as required. Beds of young alder and some other seedlings may now require thinning; composts should be turned, and all refuse vegetable matter put in heaps for rotting.

Holly, hawthorn, and mountain ash seeds will require turning in the rot heaps. Upon grafted stocks all buds and scions below the grafts should be at once rubbed off, as these divert the sap from the head of the stock.

Look through young plantations, treading up or otherwise fixing wind-waved trees, setting up tillers, clearing away rank undergrowths, marking for the next fall trees which are doing mischief to their neighbours; and taking a general survey preparatory to future operations.

This is the best time in the whole year for observing the ravages of insects among our timber trees, for studying their habits, and devising means for their destruction. Thus the bark beetle grub (*Scolytus destructor*) lives under the dead bark of trees, digging long tubular galleries between it and the wood; the wood-borer (*Sirex juvencus* attacks larch and fir trees, rendering them almost worthless for any purposes except firing; and the American bug (*Curculio*), one of the weevil family, also attacks fir trees. The leaf-rollers (*Tortrix viridana*) are very destructive among trees, and the caterpillar of the *Pygœra bucephala* feeds upon the lime, elm, oak, beech, willow, and hazel. As the latter are gregarious they soon strip trees of the whole of their leaves.

*Pluckley, Kent.* A. J. BURROWS.

## SCOTLAND.

THE past month has been a very favourable one for saving bark, and the good weather should be taken advantage of to attend to any work of that kind still remaining to be done.

Attend still to new plantations, keeping the young trees free of whins, grass, &c. Weed seed-beds, and keep the nursery otherwise clean. Also attend to recently-grafted trees; undo the ties where the graft has fairly taken, replacing it again, but leaving the tie sufficiently loose to allow the sap to rise freely.

Switch plantation and road-side hedges—this work is much easier done just now while the growths are still soft.

The present is a good time to prepare watercourses and embankments—stones are the best material when they can be got handy. This is also a good time to set plantation and field gates; in dry weather the posts can be much more firmly rammed.

W. R. R.

## WALES.

WHERE not already finished, continue as last month the dressing and removing of all oak timber and branches that have been recently felled.

The pruning and disbudding of forest trees should be brought to a close as early as possible during the present month, and branches and prunings cleared out from open drains. Continue the clearing of all rough herbage, gorse, brambles, ferns, &c., round young trees, so that they may have plenty of room. Cut all thistles, nettles, and docks, &c., along the sides of drains, and round the margins of plantations before seeding. Dig, hoe, and clean young hedges as last month, and keep wire and other fences and tree guards in good repair. Varnish or tar iron and wire and other fences while the weather is dry and warm.

As time permits commence the preparation of ground for planting during the coming season, by fencing, clearing, and, where necessary, draining and loosening the soil. By forwarding such work as early as possible it gives a good opportunity for early autumn planting.

The work in the nursery and dressed grounds will be much the same as last month—viz., hoeing, cleaning, mowing, &c.

*Kinmel Park.* LEWIS BAYNE.

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## IRELAND.

YOUNG plantations should be carefully looked over to see that all is going on satisfactorily, and that no rank vegetation of ferns, furze, or other obstructions interfere with the healthy development of the plants.

Plantations of an older growth should also be attended to, and any injurious branches or leaders removed or shortened—and also to mark for falling such trees as ought to come out.

As the peeling of oak is now over for the season, no time should be lost in clearing the ground of all spray. If the ground from which the oak has been felled is to be replanted with conifers, it may be necessary to open a few drains, which can always be best done immediately after the trees have been felled.

Go over all the drainage and free it from all obstructions. Supplement where necessary with new drains. As mentioned in this department last month, attend to watercourses and streams by removing accumulations of sand from the bed of the stream, and repairing the banks. Trim and clip hedges. Clear out open water-tables, and mow weeds and grass from the bottom of all line fences. It is essential to promote a close fence at the surface of the ground, and this can only be secured by keeping it free from weeds.

Weeds are growing apace everywhere this season; it is therefore necessary to bestow a little attention to keeping them in check.

*Ballinacourte, Tipperary.* D. SYM SCOTT.

## THE AGE OF TREES.

WRITING to the *Times* on this interesting subject Mr. C. Wolley Dod makes the following remarks:—"The late Mr. William Menzies, deputy-surveyor and head forester of Windsor Park, than whom no one had studied trees more, has often interested me by information about the size and age of forest trees when with him among them. Much of this information will be found in his large illustrated work on 'Forest Trees and Scenery.' It was his opinion that it was impossible to determine even approximately the age of oaks when the trunk is decayed. He thought that the shell of the tree near Cranbourne, in Windsor Forest (where there are many similar shells of huge old trees), which goes by the name of William the Conqueror's Oak, might probably belong to that date. Beech trees, he said, are not nearly so lasting; and though I often asked his opinion as to the age of the larger Burnham Beeches, his answer was always, 'Impossible to say.' It may interest Mr. Heath to know that on Smith's lawn, near the obelisk in Windsor Park, are the remains of a beech tree larger than any of the Burnham trees. An account of this tree and of many other remarkable trees will be found in 'Grigor's History of Arboriculture,' published in 1868—a most interesting little book, and the best I know on the subject.

"I may add that the age of large elm trees, being comparatively short, is generally definitely known; the large elm trees in Eton playing-fields are little over 200 years old; a record of their planting is in the college archives; the Long Walk in Windsor Park was planted in 1688. Both these sets of trees are fast perishing from old age. Half the elm trees in Eton playing-fields have been replaced by young ones within my memory. Elms die first at the root, and are blown down generally before the trunk has begun to decay."

Another writer, the Rev. R. S. Baker, of Hargrave Rectory, makes known the following excellent method of recording the date of the formation of a plantation, which is worthy of imitation by the planters. "In connection with this subject, it may interest some of your readers to know that at Earl Spencer's park, Althorpe, near Northampton, a stone with the date of their planting has been placed in the various plantations from Queen Elizabeth's time downwards. This custom was begun by Sir John Spencer, and has been continued ever since.

"The 300 years old oaks, on which the herons now build, are fine, tall-growing trees, with no appearance of age or decay about them."

[*Correspondents sending letters signed with initials or fictitious names are requested to enclose their name and address, as otherwise their communications cannot be inserted.*]

## THE DETERIORATION OF SCOTCH FIR.

Sir,—At the outset let me say to Mr. D. McCorquodale that although his letter on the deterioration of Scotch fir contains some valuable information, the tone is sometimes too personal. Now, a discussion in order to be useful should be entirely free from anything of that sort. The subject in hand is quite broad enough without introducing any personalities.

Mr. McCorquodale says at page 111, with regard to the foreign seed trade, that my experience must weigh but little when compared with that of those who created this "regular trade." Now, if the importation of Scotch fir seed exists at all (as certainly it does), to characterize it by no stronger term, it is an illicit trade. So much at least can be said of the trade and those who created it. Foreign Scotch fir is seldom or never advertised in nursery catalogues as such, yet the fact remains that it is regularly grown. The reason is plain. Its inferior qualities for general planting in Scotland are so well known as to affect its sale. The best proof of this lies in the fact that those who are engaged in the trade won't acknowledge it. On this point the letter which Mr. J. A. Harvie Brown publishes in your last number is of great value, and is a really important contribution to the present discussion. But the whole question might be narrowed very much—and may be put thus—how is the importation of foreign seed going to affect the cultivation of Scotch fir in this country? Will it sustain the high character which the native pine has justly earned for itself or will it not? In the nursery it does not stand transplanting so well as the native, but, if allowed to remain over one year in the lines, makes a pretty good growth. If the season is wet and sunless, the foreign plant is more liable to die off from the effects of cold; especially was this the case within my own experience in the season of 1877. When planted out into the forest, if much exposed, it is also apt to perish the first year from sheer starvation, particularly if not transplanted every year previously in the nursery. For upland planting the foreign has not the stamina of the native. But the nursery treatment of forest trees is short compared with the length of time required to mature a crop of Scotch fir, therefore the chief interest centres not in its early but in its after habit. Last winter being a pretty severe one, the most casual observer could easily detect the foreign from the native growing in the nursery, by its brown colour alone. On low-lying ground, the same could be seen in the forest also. The foliage of the foreigner is not so dense as the native, caused, it would appear, from its casting the needles or leaves earlier. It has also a strong tendency to loose the leading shoot and form contending leaders. If the soil is inclined to damp, about the age of fifteen or twenty years it becomes branchy and stunted, and generally a good many die off altogether. I would advise no one to plant it in Scotland, if intended for a permanent crop.

With regard to the altitude at which the Scotch fir grows on the Continent, on the Pyrenees Professor Balfour, in his Class-book, page 1,008, states it at 7,000 feet. I am led to believe, however, that the sources from which we draw our supply of seed are at a very different level.

I am asked how do I know that the foreign and native seeds were mixed? It might not be out of place to say that one's powers of observation are often of greater service in a case of this kind, than simply taking a thing for granted. It is not the first time that foreign seed has been sold for native, mixed and unmixed, and the initiated observer has no difficulty in distinguishing them.

Mr. McCorquodale may have my address from the editor of this Journal, and I will be pleased to fully satisfy him as to where the trees are growing that I spoke about.

W. W. R.

## PINUS SYLVESTRIS AND ANCIENT FORESTS OF THE SOUTH OF SCOTLAND.

SIR,—Allow me in the first place to thank Mr. Webb for his letter on the above subject in last issue, and also for the courteous language in which his criticism is couched.

Referring to what I said at page 24 about *Pinus sylvestris* growing naturally at an earlier period in the South of Scotland—the remark was thrown out somewhat hypothetically, and it has done good service in eliciting Mr. Webb's interesting and valuable letter, which conveys a good deal of information on the early timber supply of Edinburgh. Although it would appear history takes no notice of *Pinus sylvestris* growing naturally in the South, yet in pre-historic times we have tangible evidence that the Coniferous order was represented in the south of Scotland and north of England, at least by some of its species. The remains of gymnospermous plants have been found in a fossilized state in Granton and Craigleith quarries, Lenneil Braes in Berwickshire, and as far south as Durham. (See Professor Balfour's "Class-book of Botany," p. 1,056.) One would suppose, however, that where a plant can grow and propagate itself, if not its native habitat, it is, at all events, congenial to it. Now in the south of Scotland there are instances of *Pinus sylvestris* roducing itself readily from seed. One of the best examples of this kind falling under the writer's own observation is on Lord Haddington's Berwickshire estate. In the case referred to it is heath land, and it would appear that whenever the surface vegetation is clean heather is well adapted for the reproduction of our native Scots pine.

With regard to my authority for supposing that the roof of Holyrood Palace was timbered with Scotch fir from the neighbourhood, it was from an account which appeared in the public papers when the palace was re-roofed a few years ago. However, as I am trusting entirely to memory just now, it may have proved treacherous on the present occasion, and as truth is my object, if mistaken, no one will be better pleased than myself to hear exactly where the timber was obtained. W. W. R.

## PLANTING IN EXPOSED SITUATIONS IN THE WESTERN ISLANDS.

SIR,—During the last few years I have planted some exposed ridges, and had a great deal of trouble with the Scotch and Austrian Pines. Every winter some of them get loose at the root, requiring to be stayed, which involves much labour. On the other hand, the silver firs and hardwoods are growing well, and in a most healthy condition. What am I to judge from that when planting similar spots in future? I have planted with very fair success, in sheltered situations, the rarer kinds of the *Pinus*, *Picea*, and *Abies* tribes, also *Cupressus*, *Cryptomeria*, *Retinospora*, and *Thuja*, but I have entirely failed to rear the *Wellingtonia gigantea.* Though all sizes of plants have been repeatedly tried, and placed in all vailable situations, I have not a single living plant to reward my attempts.

THULE.

## WEEPING BEECH IN SCOTLAND.

SIR,—In reading over Mr. Jackson's interesting paper in your Journal, p. 126, on "Remarkable Trees in Perthshire," I see he says that a weeping beech growing upon Scone Estate is considered the best of its kind in Scotland. I consider a tree of the same variety growing in a plantation at Jerdonfield, on the estate of the Marquis of Lothian, in Roxburghshire, a far finer specimen than the tree at Scone. I remember some twenty-two or twenty-three years ago, that this tree was prepared for transplanting, as it was under contemplation by the late Marquis of Lothian to remove the tree to a more advantageous site in the park at Mounteviot, but after due consideration it was not done, as it was considered too large a specimen to remove with safety, and the tree remains in its original site. This tree is also from a self-sown seed, and was planted along with the other trees when forming the plantation. I believe the trees came from Dickson's Nurseries, Hawick. Perhaps Mr. Weaver, who has been over half a century forester to the Marquis of Lothian upon the estate, would give fuller particulars regarding this remarkably picturesque tree?

G. K. Dodds, *Forester.*

*Antrim, Ireland*, 10*th June*, 1880.

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## GYMNOCLADUS CANADENSIS, THE KENTUCKY COFFEE TREE.

Sir,—Though considerably more than a century has passed away since British arboriculturists first made the acquaintance of this singularly interesting deciduous tree, it is now very rarely met with in even the choicest collections. I am not sure, indeed, that it is quite able to withstand the rigours of wind and frost in the colder or more exposed districts of the country, but we are persuaded that it richly deserves a trial wherever a sheltered situation is at the disposal of any one anxious to create fine landscape effect. It belongs to the Leguminacea or pod-bearing family, and as its specific name implies, is indigenous to North America, where it is found over a very wide area. It attains a height of from fifty to sixty feet in its native forests, with upright branches—thick and blunt at the points—and apparently destitute of buds. The bark of the young wood is mealy white, giving the tree a peculiarly distinct appearance in the winter when divested of leaves. The flowers are white and very conspicuous; they appear about the middle of May and continue in perfection till July, followed by seeds which ripen in autumn: these, though now little if at all used, were formerly roasted and ground as a substitute for coffee in Kentucky and Tennessee. The wood is hard, and susceptible of a very high polish, and being of a pretty rose colour is used for the finer kinds of cabinet work. The leaves are pinnate, of a dull bluish-green tint, changing as they decay in autumn to a reddish brown.

Probably one of the finest specimens of this grand ornamental tree to be found in this country is that in the pleasure grounds of the Duke of Norfolk, Arundel Castle. It is growing in a sheltered situation, in a soil very largely composed of chalk, with a dry subsoil. As measured about midsummer last year it stood thirty-nine feet high, with a girth at three feet from the ground of four feet; the leaves were from two to three feet long by about one and a half broad; clothed as it was then with its magnificent foliage, it was a sight which few lovers of fine trees would regret having gone a long journey to see.

*Edinburgh.* Hugh Fraser.

## TARRING FENCEPOSTS.

I NOTICED in a former article that you recommend painting with coal tar for preserving fence posts. I have tried this, and seen it tried by others a great many times, and my experience is, that near the surface of the ground (the difficult place to keep sound) the preservative effects of the tar are completely neutralized in from one to two years by the action of the soil—wet and dry. I saw some oak posts treated with a covering of hot coal tar, set in July, 1869, which completely rotted off, and the fence had to be rebuilt in 1877. The location of this fence, however, was such that it was subject to frequent changes of wet and dry.

It occurred to me, some years ago, that after applying coal tar, it would be a good plan to burn it off, thus producing a charred surface, which will resist decay under all circumstances. I set some white cedar posts in this manner in 1875, and they are as sound to-day near the surface of the ground as when set, and since then I have followed the practice up quite generally. I cover the posts thoroughly with hot tar, being careful to cover to some inches above the surface of the ground, then pile up the tarred ends together, six or eight in a pile, and set fire to them, turning them over if necessary while burning, until the entire tarred surface is thoroughly charred. It is better to apply the tar hot, as it enters all cracks and checks, and also the pores of the wood, and some of it remains there under the charred surface.

It will not do to treat green posts in this manner, as the confined moisture soon rots the posts from the inside, but I can see no reason why a dry post so treated will not last for a great many years. D.M.D. *Cayuga County, N. Y.*

In the experiments which we have made with coal tar applied to wood work exposed to earth and moisture, we found it important to heat both wood and tar, to cause it to enter the pores, and this is doubtless effected very efficiently by the charring described in the preceding valuable report of experiments. Simply applied to the surface of wood exposed above ground, we have uniformly found coal tar to do more harm than good. Where we have used it for wood at the surface of the ground, properly driven into the pores, it has made it last in some instances twenty years, when without this protection it did not survive five years. In this connection we are glad to publish such full practical statements as this given by our correspondent.

*Albany, U.S.A.* COUNTRY GENTLEMAN.

# THE HOME FARM.

## OPERATIONS FOR JULY.

*Haymaking.*—Owing to the cold and late spring, no great breadth of meadow hay will have been secured before the beginning of July, and in some places clovers and mixed seeds are still upon the ground. As a rule, all fodder crops should be mown before they ripen their seeds: Italian rye-grass as soon as flowering appears, other rye-grasses when fairly in flower, clovers when in full bloom, and all mixed seeds and meadow grasses when the greatest proportion are in flower. Never expose the crops unnecessarily, as the more the sap is absorbed or retained in the plant, the greater will be the amount of saccharine matter. Where rye-grasses are mown for seed they should be tied up and stooked about two or three days after mowing. The seed is perhaps best beaten out either upon cloths or in boxes in the field, as much is scattered by loading and unloading. Tares and Lucerne should be well harvested before being stacked for fodder. All stacks should be well raked round and pulled by hand, topped up after a few days' settlement, and thatched at once. For details of haymaking see last month's notes.

*The Turnip Crop.*—This will, in many localities, demand considerable attention until after the middle of the month, by which time the fallow crops should be everywhere planted. A fine seedbed should at this season of the year be secured. Artificial manures, and in dry seasons the use of the water-drill, will ensure rapid development of the plants, and thus place them out of danger. But where they are heavily attacked with the destructive beetle in the earlier stages of their growth, take one bushel of white gas ashes, the same quantity of quicklime, six pounds of sulphur, and ten pounds of soot, see that all are finely powdered, and scatter the dust along the drills while the dew is on the plants. The above will be sufficient for two acres. Sow stubble turnips after rye, tares, or grasses, and continue to horse and hand-hoe all early crops, setting out and singling such as are sufficiently forward for these operations. Upon early land turnips may follow the pea crop, though in most cases it will be found better to put in rape and mustard. About three quarts of cole seed per acre will be ample, and the crops may either be fed off or mown for bullocks in the sheds.

*Root crop cultivation.*—The brake and hand-hoe will require to be kept in constant use among mangolds, swedes, early turnips, kale, and cabbage; and potatoes may be earthed up with the moulding plough, after the alleys have been well stirred and the land thoroughly cleaned and pulverized. The carrot and parsnip crop should also receive a final hoeing. In a dry season like the present frequent hoeing to a moderate depth keeps the land from cracking and enables the plants to take in moisture from the atmosphere.

*Hops* will still require constant shimming or nidgeting in dry weather only. Ladder-tying should not be neglected where the bine is turning from the poles. Watch for the first appearance of mould, and get the sulphurator to work at once. Pull out from the hills and remove from the gardens all superfluous bine, allowing none of it to decay upon the surface of the land. Towards the end of the month the hilling-up may be proceeded with, three or four shovels full of fine soil from the alleys being placed upon each hill. Should the aphis fly attack the gardens heavily it may be necessary to syringe the bine with a wash containing soft-soap and tobacco juice. But this is generally resorted to only in extreme cases. By means of artificial lews keep high winds from the hop gardens as much as possible at this season. With favourable weather the earlier sorts may be expected to come into burr early in the month.

*Rape* should be well hoed; *Lucerne* may be cut a second time, and afterwards hoed and treated with liquid manure; *Comfrey* may again be cut and cleaned; and *Buckwheat* will also require attention. The rape may be set out like turnips, but there does not exist the same necessity for closely singling the plants. *Kale* may still be drilled for winter use, and planted out from the seed bed for folding at the end of the autumn. Green crops, grown for manurial purposes, should now be ploughed into the land and well buried with a skim coulter, and if a crop is at once to follow, the land should be made fine, close, and firm. *Flax* should be pulled, and the land sown down with stubble turnips or rape.

*Harvest Operations.*—These will in most districts be limited to the cutting of early peas, winter beans, oats, and rye, and therefore fuller particulars will be reserved for August. Peas should be placed in small wads when cut, and afterwards be kept constantly turned in damp or wet weather, to secure a good sample. This may be well done for 6s. 6d. per acre. Beans, when a thin crop, may be pulled; but when the crop is heavy they may either be cut with the reaping machine, or bagged by hand, laid upon the ground for a few days, and afterwards set up or "hackled." This may cost 8s. or 9s. per acre. Tie up rye and winter oats in small sheaves, as both require good harvesting. Cut turnip seed. All reaping machines, corn elevators,

&c., should now be got into good order and ready for use; straw should be drawn and thatchwood prepared, rickcloths mended, and poles hoisted, and every preparation be made for the uninterrupted pursuit of harvest labours in fine weather.

*Live Stock.*—These must now be kept somewhat thinner upon the pastures. Before the end of the month lambs may be weaned and put upon the best pastures, avoiding dewy or wet clovers. The ewes should be removed to a distance and placed on short keep, and afterwards stripped twice. The lambs should be closely watched for scour, and the ewes for bad udders and footrot. Draft out all aged and inferior ewes, and at the end of a few weeks feed them out with green crops, corn, cake, &c. The store sheep should, if possible, be turned on to salt marshes, or fed upon salted pastures, having also a little salt added to their food whenever this is possible. Give feeding cattle a little cotton cake where the grass is luxuriant, and a mixture of cotton and linseed where the herbage is short. Keep weaned calves from young aftermath grass. Tares may still be fed off by sheep, and pigs shut up in the yards may also be liberally supplied with these or cut clover, lucerne, or comfrey. The farm horses will live principally upon green food, though from four to six pecks of oats per week, according to their work, will still be well bestowed upon them.

*Dairy.*—As meadows are cleared, dairy cows may at once be turned in to clear round hedges after the scythes or mowing machine. Aftermath grass is especially suited for cows in milk. Every effort should be made to keep the temperature of the dairy as low as possible. Put pails of new milk in the coldest obtainable spring water, to prevent souring. All drains in the vicinity of the dairy should be kept thoroughly clean, and a small quantity of carbonate of soda may with advantage be used among the dairy utensils.

*Poultry* for early marketing should be regularly and carefully fed. The earliest turkeys and geese intended to go out at Michaelmas will require forcing. Also set the last clutches of geese and ducks early this month.

*Estate Work.*—During the intervals of haymaking, and before harvest work engrosses the attention, all timber from the woods and fuel for the mansion should be carted and stacked while the land is sound and the estate roads are dry. Lime, stone, gravel, sand, coals, bricks, draining pipes, and fencing materials may also require cartage, and composts may be deposited in convenient spots for the planting operations of autumn.

Implements should now be looked over and undergo a thorough repair and painting, and the foldyards may be emptied, the manure being clamped where required and sprinkled over with gypsum. Hedges will also require their first switching, and post-and-rail and wire fences should be kept in good order. B.

[*The Editor desires to call attention to several questions in recent numbers, which remain unanswered, and hopes that practical readers will assist in maintaining the usefulness of this department.*]

## QUESTIONS.

56. Blight in Larch Plantations.—Enclosed are a few twigs as a sample of the way in which some young plantations (larch) in this locality are blighted. Sample 1 represents the mildewed state of foliage last summer; 2, the dying state of the young trees this year. The blight is not confined to spots unfavourable to the growth of the larch, but in different soils and situations, lying miles apart. Trees from five to ten years planted seem to have suffered more severely than younger ones (many of them already dead); such as have attained the age of thirty are but slightly affected.

Would you, sir, or any of your correspondents kindly say whether the continued wet weather last summer has been the origin of this evil, or from whence has it sprung ?—Larix.

57. Pine Beetles.—These beetles commonly confine themselves to their haunts as long as there is food for them, but when this is exhausted I should like to know whether they die of starvation, or if they fly away, as it is noticed that places become clear of them in a number of years. Perhaps some of your readers may know whether pine beetles do really fly, and the season of thei flight ?—A. D. B. N. B.

58.—Propagating Rhododendrons.—Can you tell me if propagating Rhododendrons by cuttings is a good and successful method of increasing choice kinds ?—J. H.

[They can be successfully propagated by cuttings, but it is a rather slow process. Layering is much better, if the plants are of some size, and it should be done shortly after the plants have done flowering. The usual method of propagating choice Rhododendrons is by grafting them on stocks of the common Rhododendron (*R ponticum*) in the spring, just as growth is starting. For safety they are worked and started under glass, in the nurseries.—Ed.]

## ANSWERS.

53.—Gorse Cutting Machine.—I can confidently recommend H. L. M. the "Furze Cultivator," McKenzie & Sons', Limited, Camden Quay, Cork. I got one of these last winter and cut up some 25 tons of gorse with it in a quick and perfect manner; after passing through the machine the gorse came out as fine as moss, and helped most materially to keep in the best condition they ever were in my horses (seven) and yearling calves. The one mentioned is economical, substantially put together, and if only more generally used would prove more commensurately beneficial. I don't know whether these machines can be got in London, but if your correspondent will place himself in communication with the makers they will furnish every information, or if the writer can serve his ends further he will be glad to do.—Henry Cook, J.P.

The "Gorse Masticator," manufactured by Messrs. McKenzie, of Ceres Iron Works, Cork, Ireland, and of Camden Quay, to which was awarded the Silver Medal at Kilburn, and which is figured and fully described in No. XXX. of the Journal of the Royal Agricultural Society of England, is probably the best machine in existence for crushing and preparing gorse. It also possesses the additional advantage that it will kibble maize, beans, &c. The tendency of the gorse to clog the rollers is in this very ingenious machine counteracted by a series of scrapers which work immediately under the masticating rollers. The gorse is fed as in an ordinary chaff-cutter, by means of a box and rollers. The cut gorse then falls upon the masticating rollers. At the trial this machine crushed about 6½ lbs. of strong gorse per minute with an expenditure of steam equal to 2½ h.p. The judges considered it equal to about 2 tons per day. The price of the machine complete, with an 11-inch feeding box, is £15 15s.—A. J. B.

[Several other correspondents also recommend Messrs. McKenzie & Sons' machine.—Ed.]

54. Brickmaking on Estates.—If Major Louth wishes to commence brickmaking on a small scale only to meet a local demand, and not to erect expensive machinery, the following may answer his purpose. He will be enabled to turn out from 45,000 to 50,000 bricks per week. His first requirements will consist of a clay mill, a shed containing from 700 to 750 superficial yards—say 120 yards long by 6 yards wide—and from 1,100 to 1,200 superficial yards of working floor. He may thus employ 6 moulders. Two kilns capable of burning 35,000 bricks each will also be necessary. Each kiln would thus have to run once in every 10 cr 11 days. If anything beyond the manufacture of common bricks be required, he must also have close places or cellars for ripening the ground clay, a tempering shed, a drying house, and a wash mill. If cottage accommodation is already at hand, little more will be required beyond tool sheds and the necessary brickmaker's tools, the principal of which are moulds of brass or copper, the moulding table and fittings for each moulder, planes and clappers or beaters. Of course common shovels, picks, barrows, planks, sieves, &c., must be provided. With a proper undertaker to assume the management of the yard and to manufacture, burn, &c., by the 1,000, a profitable business may soon be set going. But if more extensive works are contemplated, further hints may be obtained from the article on "Brick and Tile Making," in the present number.—A. J. B.

# The Buckland Yew.

IN a communication to the *Gardeners' Chronicle* of May 1, relating to the recent successful transplantation of the ancient Yew growing at Buckland, near Dover, Mr. William Barron, of Elvaston, says:—"This venerable relic, certainly over 1,000 years old, has lately been removed from its former resting-place to a quiet home in Buckland Churchyard, a distance of sixty yards. This 'act of vandalism' is not such a serious matter after all, when one considers that a final place of rest more appropriate could not be found for the old Yew tree, than to be with all due reverence deposited in its own burial-ground. This was most satisfactorily accomplished on March 1, 1880. This Samson of Yew trees, which has weathered so many wintry storms, and is yet in luxuriant health, has been doomed to speedy and certain death on the authority of no less than two of our leading professors of tree lore! Poor old tree! In accordance with this view, the coroner of Dover kindly offered his services to hold an inquest over the tree; but I could not conscientiously employ him, knowing that in all probability this grandfather of the forest will outlive some generations yet unborn. I am charitable towards a doubting public when I find men who, notwithstanding their high position as public teachers, are so far behind the times as to give proof of their ignorance by speaking or writing with authority on a subject of which they have little or no practical knowledge. In justification of these remarks, which I make with no intention of giving offence, I give a quotation from a letter received by the Vicar of Buckland, in answer to an application for advice about removing this tree: 'I thank you for your very interesting letter, and for the opportunity it gives me of protesting against any attempt to injure, much more to transplant the old Yew, which latter will result in its death. There is no precedent for the successful transplantation of any tree of considerable age or bulk, and to experiment on such a specimen as that at Buckland Church would be an act of vandalism that would surely be reprobated for as long as the memory of the tree and the history of Dover lasted.' Another eminent professor in dendrology said to me on my return from Dover that I was 'a real Vandal among trees.' To this charge I suppose I must plead guilty, seeing that my knowledge both of the tops and roots of trees, and of their requirements for successful culture, and in several instances for their identification, have caused me to be called upon to use my grub-axe to uproot the prejudices and opinions of those who have been opposed to my rough practice. It would be more to the credit of scientific men when asked their advice on practical matters to say, 'Really, I do not feel competent to advise you on this question; you had better apply to —— to do so,' than to dogmatically assert what they do not understand.

"For the benefit of such as are troubled with short memories, or wanting in practical information, allow me to say that, instead of there being 'no precedent for the successful transplantation of any tree of considerable age or bulk,' as aforesaid asserted, the gentleman who recently obtained the City of London appointment as Superintendent of the Epping Forest, and who carried out the planting of the Thames Embankment, gave his evidence on oath in the Court of Queen's Bench some years ago, that he had examined two large cedars of Lebanon which I transplanted in Surrey, one in the third week of July and the other in the first week of August, both then in active growth, and that two years after they were transplanted, he found them both growing and in perfect health. One was over 50 tons, and the other over 60 tons in weight. Both trees were about 50 feet high; the largest was removed with a mass of soil undisturbed which measured 18 feet long, 15 feet 6 inches wide, and 3 feet 7½ inches deep. The circumference of the trunk was 11 feet 6 inches, and the branches measured across 59 feet. Large old Yew trees, from 300 to 800 years old, have been removed many miles on my transplanting machines to Elvaston Castle and other places more than 30 years ago.

"The Buckland Yew had originally a double trunk, which divided a few feet above ground; the larger of the two had been thrown down (not struck by lightning, as erroneously stated, but) by an 'act of vandalism,' which was allowed to be perpetrated some 150 or 200 years ago, as follows:—A brick vault had been built close to the trunk of the old tree on the south side, and in excavating for this vault all the roots on that side had been cut for a distance of 8 feet. As soon as I saw the vault I told the vicar at once the sole cause of the main trunk being laid horizontal, viz., that we should find that large roots which had been the mainstay to support and keep the stem upright had been sawn off. This I found to be the case as soon as the brickwork was removed.

"The removal of the large block of soil, the massive and weighty trunk and heavy branches of this gigantic tree, was, with the great experience which I have had in former years, comparatively an easy task compared with the great difficulty of supporting and carrying in their horizontal position the main trunk and the two enormous limbs, extending south and west, with their branches extending over 33 feet. The tree was supported in its horizontal position on a large timber-dray on four long balks of timber. This dray, with its heavy load of limbs and branches, was made to move simultaneously with the main trunk, with its upright limb, and mass of soil containing the brick vault and the whole of the roots. The entire block of soil and roots removed measured as follows:—Length, 16 feet 5 inches by 15 feet 8 inches, by 3 feet 6½ inches deep, together with eight large balks of timber. Many planks were used to hold the soil together, it being very friable—a mixture of chalk and sand. The circumference of the main trunk is 22 feet; do., upright trunk, 6 feet 10 inches;

do., second horizontal trunk, 10 feet 10 inches; do., south limb, forking off at 9 feet from main trunk, 7 feet 10 inches; do., west limb, forking off at 9 feet from main trunk, 8 feet 8 inches; extent of branches from centre of main trunk southwards, 30 feet 10 inches; and from north to south, 48 feet; they extend from main trunk westward 33 feet. The entire mass removed was 56 tons.

"In placing the tree in its present position, by preparing the ground on a slope two ways and by leaving one balk of timber under, I was enabled to cant the horizontal trunk and limbs to nearly the same angle as the limb which was formerly upright; and by so doing the fine mass of foliage now presents a uniformity of outline which could never have been accomplished by any other means. The Vicar has written me as follows:—'The tree, by universal consent, looks far grander than it has ever done before, and when the grass grows will be a beautiful object.'

"This remarkable tree is of the male sex, with a most extraordinary exception, viz., a small solitary female branch. In the whole course of my experience I only know one other example of a similar kind, which still exists in the original Golden Yew which I planted at Elvaston Castle more than forty years ago. When I mentioned this singular freak of Nature to the late Sir William Jackson Hooker, then in charge of the Kew Gardens, and whom I knew when Professor of Botany at the Glasgow University, he told me that he had never known another instance of the kind. From this branch, several years ago, I obtained a very superior breed to the elegantissima var., that being only a cross with a green and golden variety.

"Before concluding, I take this opportunity of thanking most cordially the Vicar and his lady for their extreme kindness, and also my other Dover friends, who seemed to vie with each other in rendering us every help in their power in supplying us with such necessary appliances as were requisite to be obtained on the spot. The motive-power used was obtained by the aid of crabs, pulley-blocks, and powerful screw-jacks."

The Editors of the *Gardeners' Chronicle* remark as follows upon the foregoing:—"We have laid ourselves open to Mr. Barron's rebuke by our comment on this proceeding at p. 305 of our present volume, where we spoke of it as an 'act of sacrilege;' and even after Mr. Barron's explanation we are not disposed to alter our opinion as to that point. That Mr. Barron could, given the proper appliances, move Westminster Abbey itself we do not doubt, but it would be none the less an act of sacrilege to attempt it. Nevertheless, the feat, in the case of this celebrated Yew, has been accomplished with all the skill and care that Mr. Barron's previous work in this department would lead us to expect. But Mr. Barron will not, we presume, deny the risk he has run, and we now await the result, in earnest hope that our fears may prove to have been vain. It would be interesting to have a record of successes and failures in the removal and transplantation of trees of over 50 tons in weight.

"We supplement Mr. Barron's account with a few notes on this now doubly famous Yew. There is a tradition that the tree is mentioned in *Domesday Book*, but after diligent search in Hasted's 'Kent' and in the Rev. L. B. Larking's magnificent facsimile and translation of that portion of our national record pertaining to Chent (or Kent), we find no reference to the Yew in question, though Bocheland is frequently mentioned. It may be of interest to some of our readers to see the plan upon which this famous record is drawn up. We therefore cite the following passage, relating to the manor in question:—'Osbern holds of the Bishop, Bocheland. [The Bishop was Odo of Baieux.] It answers for three yokes. There is the arable land of one team. In demesne there is one. And three villans [tenant farmers] with two bordars [labourers], have half a team. Eight slaves there. In the time of King Edward it was worth four pounds. And afterwards three pounds. And now seventy shillings.' It will be a matter of surprise to hear of slaves in the time of the Conqueror, but, as the Editor points out, the condition of these *servi* was not worse than that of many an agricultural labourer in our own times. In another entry relating to 'Bocheland' the church is specifically mentioned, but not the Yew. Hasted relates, that 'in the reign of Edward III., Agnes Barrie was seized of this manor and 42 acres of pasture of the King, by the service of paying one red Rose yearly to the King.' We should like to know what that rose was like! Reverting to the Yew which has led to these remarks, we may mention that, in 1833, the Rev. W. T. Bree published in *Loudon's Magazine of Natural History* an account of this Yew, to which he applies the quotation—

> "A noble wreck in ruinous perfection."

Mr. Bree's paper is accompanied by a woodcut illustration, so different from the present appearance of the tree, that it is difficult to understand how it could have been taken from the same tree. Mr. Bree, however, admits that the woodcut he gives is not a faithful portrait. Mr. Bree, alludes to the story of the tree being struck by lightning upwards of sixty years ago—he wrote in 1833. This information he obtained from an old inhabitant, who told him that the steeple of the church was demolished at the same time.

"It is worth citing Mr. Bree's account of the appearance of the tree nearly fifty years ago, and comparing it with that given by Mr. Barron. 'To this catastrophe [the stroke of lightning] no doubt is to be attributed in great measure much of the rude and grotesque appearance which it now presents. At a yard from the ground the butt, which is hollow and on one side extremely tortuous and irregular, protruding its knotted fangs like knees at the height of some feet from the surface, measures 24 feet in circumference. It is split from the bottom into two portions; one of which at the height of about 6 feet again divides naturally into two parts; so that the tree consists of a short, squat butt, branching out into three main arms, the whole not exceeding in height, to the extreme top of the branches, more than about 25 or 30 feet. Of what may be regarded as the original branch and arms, but little I conceive now remains alive; two considerable portions, however, are still conspicuous in the state of dead wood, viz., one on the inner part of the northern limb, hollow and forming a sort of tunnel or chimney; the other on the western limb more solid and exhibiting the grain of the wood, singularly gnarled and contorted. These, which I have ventured to call portions of the original trunk and arms, are partly encased, as it were, on the outside by living wood of more recent growth. . . . The trunk is decayed and hollow at the bottom, but from within the shell there arise two or more vigorous detached portions of small diameter, which soon unite to the main wood, and run up to a considerable height, lapping into one another, twisting and interlacing in a very striking manner, so as to suggest the idea that the trunk has been ripped open, and is now exposing to view its very entrails. Mr. Bree goes on to reprobate the wanton spoliation and injury to which the tree was subjected in his day. 'Many considerable boughs, which must have trailed almost on the ground, have lately, it seems, been lopped off in the fine spirit of modern vandalism.' "

## CULTIVATION OF THE AUSTRALIAN BLUE GUM.

We fear our correspondent "Eucalyptus" gives us credit for more personal knowledge of the subject he refers to than we possess. Our experience has certainly not been much more favourable, if so much so, as that of many of our neighbours. Occasionally every one, nearly, of a set of plants put out will grow, but frequently a very small percentage will leave, especially if the plants are allowed to grow big. When they do grow, the trees stand wind better in stiff soil than they do in the loose soil near walks—that is, when exposed to wind. In such positions there seems nothing for it but to put *two* large, long stakes slanting inwards to each tree from south-west and north-east. The trees seem naturally to have little tap root, but we have seen one from which the earth had been cut away buttress itself by a tap-root rivalling the trunk in size. The seed seems to grow readily, spread over an unsheltered bed and watered when the weather is dry. Transplanting is the difficult matter, and we should recommend balls of earth and temporary shading. Better go to the expense than lose set after set of plants. But we once published an account of Colonel Beddome's process. It was to cut the bamboo of which estate baskets are made, and which is not more than an inch or two in circumference, into bits about three inches long. Place these pieces endways close together, in thousands; cover over with forest mould or fine soil and sow your seed. In this way there will be from one to three or four seedlings in each bit of bamboo. When carried out in the bits of bamboo the best plant can be left, the others being removed and utilized immediately or at a subsequent period. Perhaps planters with more experience will give our readers the benefit of their information. A new interest attaches to the cultivation of the Eucalypti as breakwinds or separately, from the fact that the fine straight timber makes excellent sleepers for railway inclines, where hard wood is desiderated. The trees, many of them, are well grown at eight to ten years old.—*Ceylon Observer.*

# Boulevard and Promenade Trees.

The enmity to trees so long characteristic of the inhabitants of cities, and especially those having the administration of municipal affairs, is fading so fast, that we may hope to see a complete revolution in the aspects of all our great centres of population. There is growing a passion for promenades and boulevards, planted with beautiful trees and shrubs; and although it can be but slowly and with but variable certainty gratified, yet there is a disposition to make the best of things, and that is a great advance on the love of narrow streets and ignominious architecture that prevailed as it were but yesterday to the serious detriment of health and cheerfulness. While towns are small there is—or appears to be—no great necessity for trees and gardens to vary the monotony of their brickiness. Hence narrow streets are formed, and the economy of the public ways so firmly settled in mischievous grooves, that when by the growth of the town the green country has been pushed miles away, it is found next to impossible to find a bit of ground whereon a tree, or even a blade of grass, may become established to mitigate the unhappy conditions. Thus the central parts of most of our great towns and cities are beyond the relief that green leaves would afford, to say nothing of the actual need of trees to give fulness and effect to noble architectural masses. It may be permitted of a Haussmann to cut sheer through the heart of a city and change the scene, but we do not expect that in our time the central parts of London—as for example, the line of thoroughfare from Aldgate to Charing Cross, or from the "Angel" to the "Elephant and Castle"—will be made to vie with the Champs Elysées or the Avenue Gabriel. We must make the best of things as we find them, keeping in view, however, whenever new roads are formed or great improvements are contemplated, the necessity for establishing trees in towns, with occasionally open spaces that may with credit to the community be spoken of as gardens. Our towns grow so fast that they will become vast sepulchres if they are not enlivened with vegetation.

The noblest of the boulevards in Continental cities are invariably those that have naturally become such. A line of fortifications or a "bulwark" becomes useless, and affords a promenade commanding views of the country. Thus we have the "Boulevard" in the first instance, and we may regard it as a terrace that accident has given us possession of, and the more to be valued because affording space for grass and flowers as well as for trees. It is the special merit of the Thames Embankment that, although it has not grown out of a rampart or bulwark, it has grown out of circumstances very similar, and follows a line which, in a Continental city, might in days gone by have been strongly fortified. If being within, and not without the City, it does not command views of the open country, it has for its perpetual enlivenment the breeze and the glimmer and the traffic of the river, and its plane trees are not only appropriate, but absolutely necessary adornments. Every new thoroughfare made in London ought to be made wide enough to allow space for two rows of trees at least, for where this is the case, abundant air and light are secured, the public flock to the cheerful footways, and the goods in the shop windows can be displayed to advantage.

A very important advance in street architecture may be hoped for as the result of a favourable recognition of trees as proper inhabitants of cities. In narrow streets, high-class architecture is crushed out of sight; it is a waste of money to pile up a fine façade where it cannot be seen, and, moreover, the architecture of a narrow street ought to be as flat as possible, because the fine shadows that are characteristic and expressive of good work become evils where light is scarce, though so desirable where there is proper space for dignified display. We are too much tied up to certain tame styles that reflect but too faithfully only degeneracy in matters of taste, and hence it is that the average Englishman experiences a succession of surprises in visiting first-class Continental cities; and of course when he returns home he asks, "Why cannot we make our cities beautiful?" Well, the answer is that we can if we like. The reason we have been content with organized dreariness is because we have been deficient of taste and public spirit, and in London the case has been aggravated by the fact that there was no local government, and even now there is not such a local government as is needed for the administration of the largest cluster of houses in the world.

The ruralizing process has been more or less prejudiced by unworthy endeavours. When a proprietor or a local board enters upon tree-planting and does the work badly, the cause is injured, even to a greater extent than might be inferred from a consideration of the amount of money wasted. In several parts of London may be found examples of trees planted, not by the dozen or score, but by hundreds, the future fate of which must be discreditable to all concerned, for the simple reason that the work has been done badly. To open a hole and stick in a young tree, and then tie it to a slender stake that a strong breeze will bend into a letter S, or some other letter that requires a curve, may do fairly well in a country garden, for the tree will thrive if it has but repose for a few months to strike out roots in its new position. But in a London street the case is very different. There a crooked willow wand affords no support to a lanky plane tree, nor does a soil composed of clinkers and shingle afford ready food to its searching roots. It would be always better in the interest of trees and of agreeable thoroughfares that there should never be a tree planted unless it is done well, for bad work only brings disgrace and puts the cause back by furnishing the retrogressionists with a telling argument.

In the selection of trees for public promenades, the advice of an experienced planter should always be secured, for the tendency is to begin and end with plane trees, whereas we are not of necessity restricted to this course, even in London, where, beyond doubt, the plane is invaluable. The trees that are actually thriving in London indicate in an unmistakable manner that there is a wide field for choice, and therefore we may have a variety of effects instead of repetitions. We see in Paris, Brussels, Berlin, and other cities, that in respect of climate and other conditions agree pretty nearly with London, that even if we allow the plane to take the lead, we may also allow it to have a various following. The ash trees in the Rue Royale are as healthy as any trees in Paris. The noble elms in the boulevards of Brussels are as thrifty and vigorous as the elms in the parks and gardens beyond the city. The lime trees in Berlin are not the only trees that thrive in that sandy city. In the great Dutch towns we see Lombardy poplars, elms, and limes thriving on hard roads, and in an atmosphere that is by no means innocent of coal smoke. The two hundred trees in Finsbury Circus comprise some thirty sorts at least, and they are all in a thriving state. The beautiful *Planera crenata* would vie with the *Platanus* or with any other town tree in attaining to stateliness and beauty if only properly planted and prudently taken care of. For all practical purposes we may plant many of our towns with any hardy trees that are suitable in character, without staying to consider if the smoke will kill them. Certain localities in which poisonous fumes prevail, will, doubtless, prove deadly to trees as to human beings, but the influence of local circumstances does not extend far, as the case of the Lambeth Potteries proves. In the immediate vicinity of the potteries trees will not live, but at the short distance from them of Westminster Bridge the plane trees are as healthy as any on the Embankment; in fact, the finest trees are at the western end of the "finest boulevard in Europe."

It is much to be regretted that we have nowhere an experimental garden devoted to the determination of the relative fitness of hardy trees and shrubs for planting in cities. The Arboretum at Chiswick passed out of existence without leaving any record of the teachings that, in respect of this particular matter, might have been obtained from it. There are situations in London, and, indeed, in all great towns, where such a work could be carried out; but the question will arise, who is to pay for it? A strong municipality might indulge in an experimental garden for the sole purpose of rendering it subservient to public interests, the garden itself being devoted to the public service in another way as a promenade and recreation ground. It might, indeed, pay its way well by the simple process of preventing mistakes, for mistakes in planting are costly, as some folks will discover as time goes on. But its chief use and justification would be that it would direct guidance in the selection of materials for planting promenades and boulevards, and thus the risk that attends the planting of trees of many kinds would be reduced to a minimum. There can be no doubt that, instead of being tied up as it were to one tree, we should, by the aid of an experimental city garden, be enabled to adorn our streets and open spaces with many kinds of trees, and an avenue of *Ailanthus Robinia* or tulip-trees might do very well to begin with. As the case stands, planters are compelled to walk in a groove, because they are governed by municipal bodies, and those bodies have to confront £. s. d. at every step they make. A. M'Kenzie.

## TREES AND SHRUBS versus GROUND GAME.

The following remarks are extracted from an interesting article in the *Journal of Horticulture*, by Mr. G. Abbey, Grinkle Park, Yorkshire:—

Hollies were completely destroyed by the hares and rabbits during the past two severe winters; also the Laurestinus and common Laurel. Arbor-Vitæs, indeed all Thujas, were injured. Junipers, and all the young growth of both the common and double Furze, were eaten, and in many instances even the main stems; Broom shared a like fate, and such indigestible food as Heather was not left untouched. Berberis or *Mahonia aquifolia* afforded ample food both in foliage and stems. Irish Heath has completely gone, indeed it is a capital forage plant for them when food is plentiful; and of the leaves and young growth of Arbutus nothing remained except the parts out of reach and the main stems. Thorns and the Pyrus family generally suffered, especially *Cydonia japonica*, also the common and Weeping Ashes; and young plants of Oaks, Larches, Scotch and Silver Firs were injured severely. Norway Spruce Firs were closely cropped, and the Norway Maple with the Sycamore were barked, also many Willows and Poplars. Newly-planted Hemlock Spruces were quite gone, and Austrian Pines appear to have afforded plenty of food, being more eaten than any Pinus of the same age. *Pinus cembra* received a good lopping, and Sweet Bays were in some instances quite destroyed. *Pinus excelsa*, beyond the loss of foliage and part of the young growth, was better off than most others, and similar remarks apply to Wellingtonias. Evergreen Oaks were much disfigured, *Cryptomeria japonica* appearing to have been a dainty morsel. Roses in 1878-9 were eaten to the snow-line, both wood and bark; neither the Sweet Briar nor the common Briar escaped. *Euonymus europæus* had the young wood nibbled, but was not barked. Ivy was closely cropped, and Elms with Limes were barked considerably. Beeches, Laburnums, Forsythias, and Privets were nibbled, and Guelder Roses also, especially *Viburnum dentatum* and *V. plicatum*, while Deutzias have been sorely tried, *D. gracilis* being cut off. *Taxodium sempervirens* much eaten, and Aucubas too. Syringas were somewhat nibbled, but not much, and the same remark applies to Weigelas. *Cupressus Lawsoniana* was not touched; the rabbits and hares appeared to find these trees more palatable in summer than in winter. The white American Spruce was not much damaged, nor *Abies Menziesi*. *Piceas grandis*, *nobilis*, and *Pinsapo* were very little injured. *P. Nordmanniana* was treated somewhat more severely. Spanish Chestnut and Horse Chestnut were barked completely.

Ribes had the young growths nibbled off, also Berberises. Portugal Laurels had the young growths considerably lessened, and English Yews suffered similarly, but in the case of the two last only the shrubs that had been recently transplanted were interfered with, and it is remarkable that the most injury has been done to shrubs and trees in a weakly state, or to those that had not been long transplanted. I must not omit to mention *Araucaria imbricata*, which had the young shoots and leaves cut off, and *Skimmia japonica* has been eaten off completely. Both the Atlas and Lebanon Cedar had the young growths severely cut, and the Deodars were barked.

Summarizing the above, it is remarked that the Beech, *Cupressus Lawsoniana*, *Thujopsis borealis*, white American Spruce, with Portugal Laurel and English Yew, also *Retinospora pisifera*, Wellingtonia, and Piceas (except *P. pectinata*), did not suffer to such an extent as to interfere with their after-growth.

Rhododendrons, Kalmias, Andromedas, Irish Yews, Corsican Pine, Birch, and Alder received no injury.

## THE INDIA-RUBBER TREE.

A correspondent in the Brazils gives the following interesting particulars of the process of tapping the India-rubber or caoutchouc tree, and of manufacturing the gum into shoes and other things, in the *South American Journal.*

The caoutchouc tree grows, in general, to the height of forty or fifty feet without branches; then branching, runs up fifteen feet higher. The leaf is about six inches long, thin, and shaped like that of a peach tree. The trees show their working by the number of knots, or bunches made by tapping; and a singular fact is that, like a cow, when most tapped they give most milk or sap. As the time of operating is early day, before sunrise we were at hand. The blacks are first sent through the forest, armed with a quantity of soft clay and a small pickaxe. On coming to one of the trees, a portion of the soft clay is formed into a cup, and stuck to the trunk. The black then striking his pick over the cup, the sap oozes out slowly. A tree gives daily about a gill. The tapper continues in this way tapping about fifty trees, when he returns, and with a jar, passing over the same ground, empties his cups. So by seven o'clock the blacks came in with their jars ready for working. The sap at this stage resembles milk in appearance, and somewhat in taste. It is also frequently drunk with perfect safety. If now left standing it will curdle like milk, disengaging a watery substance like whey.

Shoemakers now arrange themselves to form the gums. Seated in the shade, with a large pan of milk on one side, and on the other a flagon, in which is burned a nut peculiar to this country, emitting a dense smoke, the operator having his last, or form, held by a long stick or handle, previously besmeared with soft clay (in order to slip off the shoe when finished), holds it over the pan, and pouring on the milk until it is covered, sets the coating in the smoke, then giving it a second coating repeats the smoking, and so on with a third and fourth, until the shoe is of the required thickness, averaging from six to twelve coats. When finished, the shoes on the forms are placed in the sun the remainder of the day to dry.

Next day, if required, they may be figured, being so soft that any impression will be indelibly received. The natives are very dexterous at this work. With a quill and a sharp-pointed stick they will produce finely-lined leaves and flowers, such as you may have seen on the shoes, in an incredibly short space of time.

After remaining on the forms two or three days, the shoes are cut open at the top, allowing the last to slip out. They are then tied together and slung on poles, ready for the market. There pedlars and Jews trade for them with the country people, and in lots of one thousand or more they are again sold to the merchants, who have them stuffed with straw, and packed in boxes to export, in which state they are received in the United States. In the same manner any shape may be manufactured. Thus toys are made over clay forms. After drying, the clay is broken and extracted. Bottles, &c., in the same way. According as the gum grows older it becomes darker in colour and more tough. The number of caoutchouc trees in the province is countless. In some parts whole forests of them exist, and they are frequently cut down for firewood. Although the trees exist in Mexico and the East Indies, there appears to be no importation into the United States from these places. The reason, I suppose, must be the want of that prolificness found in them here.

The caoutchouc tree may be worked all the year round; but generally in the wet season they have rest, owing to the flooded state of the woods; and the milk being watery, requires more to manufacture the same article than in the dry season.

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SALE OF A FIFESHIRE ESTATE.—The small estate of Dunduff, in the western district of Fife, has been purchased by Mr. John Reid, of London (a native of Dunfermline), for £8,500.

FINE SPECIMENS OF SALISBURIA ADIANTIFOLIA.—There is in the grounds adjoining Frogmore House one of the largest and most symmetrical specimens of this handsome tree that has yet come under my notice. The tree in question is fully 90 feet in height, and proportionate in every way. There is also a fine specimen of this tree growing in Mr. Cutbush's nursery at Highgate, but it is not more than 60 feet in height.—H. B., *in the "Garden."*

**Forest Burned in France.**—Fifteen acres of firs in the forest of Fontainebleau were burned down one Sunday last month, it is believed through the carelessness of a smoker. Many of the trees were those which were killed by the severe frost of January, 1879, but by good luck none of the old picturesque ornaments of the forest suffered from the fire.

**Sale of an Estate.**—The estate of Largan, adjacent to the town of Coupar-Angus, which belonged to the late Mr. Alexander Morrison of Bognie, extending to 70 acres, with the mansion-house thereon, was recently exposed to public sale, and after keen competition it was bought by Mr. John Stewart, of London, for the sum of £6,580.

**Plantation Burned in Ayrshire.**—A serious conflagration took place on the 3rd of June, in a valuable fir plantation belonging to the Earl of Eglinton, at Auchans, near Dundonald, Ayrshire. About six acres were totally destroyed, and the remainder of the plantation was only saved by strenuous exertion in cutting down and clearing the trees from a wide space around the fire, in which it soon exhausted itself. The plantation was about ten years old and in a very thriving condition. The fire is supposed to have originated from a spark falling from a passing locomotive engine, and the dry state of everything helped the rapid spread of the flames.

**A Rare Tree.**—I have never seen any special mention of the tree called *Virgilia lutea,* and which ought to be more widely known. It was first discovered by some explorers among the Rocky Mountains, and by them named from the poet Virgil. There is one very rare tree in the little village of Long Meadow, Mass., on the lawn of Woodbine Cottage, just now being advertised for sale. It was bought in the greenhouse of a Boston florist, and said to be a hothouse plant. As a somewhat doubtful experiment, it was planted out in the year 1848, and has grown to a very great height. Each alternate year its blossoms attract great attention. They resemble an ostrich plume, and as they bend gracefully downward, almost sweep the lawn beneath. It has a handsome green pinnated leaf, which of itself is rarely beautiful without the blossom.

**Plantation Burned near Aberdeen.**—Early on the morning of Wednesday 26th ult., the wood of Tullos, in the parish of Nigg, Kincardineshire, about a couple of miles from Aberdeen, was discovered to be on fire. The wind was blowing strongly from the south-west at the time, and as the underwood was thick and very dry, the flames spread with great rapidity. At times the flames rose to a great height, and, as seen from the town of Aberdeen, had a most alarming appearance. The whole wood, extending to about forty acres of thriving trees, was completely burned, and at a late hour of the following night there was still a considerable amount of fire to be seen smouldering among the charred débris. No estimate can yet be formed of the total loss, but it must be something considerable.

**APPOINTMENT.**—Mr. James Barton, who acted for the last five years as forester to the Earl of Mansfield, at Lynedoch, has been appointed head forester to the Marquis of Salisbury, at Hatfield.

**DISCOVERY OF A FOSSIL FOREST AT OLDHAM.**—We learn from the Manchester papers that an interesting discovery has been made at Edge Lane Quarry, Oldham. The quarrymen, in the course of their excavations, have come upon what has been described as a fossil forest. The trees number about 12, and some of them 2 ft. in diameter. They are in good preservation. The roots can be seen interlacing the rock, and the fronds of the ferns are to be found imprinted on every piece of stone. The discovery has excited much interest in geological circles round Manchester, and the "forest" has been visited by a large number of persons. The trees belong to the middle coal measure period, although it has been regarded as somewhat remarkable that no coal has been discovered near them. The coal is found about 250 yards beneath. Professor Boyd-Dawkins, of Owens College, has visited the quarry, and declares there is not such a sight in Europe.

**REMOVING TREE STUMPS BY TONITE.**—The removal of tree stumps is being carried on here on an extensive scale, with the object of improving the landscape, and also to bring the land into cultivation, in preference to replanting it with timber. Before commencing operations the most reliable authorities were consulted as to the best method of getting the stumps out of the ground, and nearly all agreed that the most economical and expeditious method was to blow them out with dynamite, or some other powerful explosive. Tonite was selected, as it is a very safe and also a very powerful explosive. It is exploded in the same manner as dynamite. A piece of ground was marked out, the stumps counted, and the men set to work in exactly the same manner and with the same tools described by Mr. Smith, of Mentmore (see page 58), a gentleman experienced in the use of the explosive being present to instruct the men. Nearly all the stumps were blown out in a most satisfactory manner; in a few instances, however, the soil was blown out from under the stump, and the stump itself split up through the centre, which rendered it an ugly customer to deal with. It could then only be got out by placing some large stones in the hollow, and laying a few cartridges on them close up under the least injured portion of the stump, and firing again. After the number of stumps to be experimented upon had been blown up, such roots as remained were dug out, and the ground cleared; the cost was calculated, and everything was so satisfactory that it was decided to go on with the use of explosives. But before doing so it was decided that digging them out should have a trial, and accordingly a few good labourers were set to work, who, as they went on, found out the best way to do the work, and also the most suitable tools; and in the end it was discovered that they could be got out in a more economical and efficient manner by digging than by blasting. The work has since been done by contract. The conditions were that the stump was to be dug out with all the roots that were near the surface, and the hole refilled, and it was found that it could be done at about half the cost of blowing them out. Of course when dug out entire they are not so convenient for handling as when blown to pieces, but the smaller stumps can be carted away, and the larger ones rolled on to a trolly, and so drawn to somewhere out of the way, as they cannot very well be utilized for fuel. I may add that our soil is deep, light, and sandy, and in a soil of that nature an explosive would not have the same effect on a stump as it would in a soil that was closer and more retentive.—*G. Griffin, Slebeck Park Gardens, Pembrokeshire, in "Gardeners' Chronicle."*

LOWS' LIBRARY ASSOCIATION SAN FRANCISCO

# EDITORIAL NOTES

THE district selected for the forthcoming excursion of the Scottish Arboricultural Society, on the 5th and 6th of the present month, is one of the most interesting to the arborist of any in the south of Scotland. Tweeddale, the ancient and still popular name of Peeblesshire, has long been noted for the rich, mellow beauty of its picturesque, sylvan dales, as well as celebrated for being the scene of many a stirring tale of Border feud and foray. The numerous additions which have been made to the extent of its woodlands during the present century, have generally been executed with commendable taste and in excellent keeping with the natural aspects and distinctive features of the country. Rocky glens and bare hill-sides have been judiciously clothed with thriving plantations, adding much to the beauty of the landscape, and largely increasing the value and productiveness of the soil. The whole district affords one of the best examples of the vast improvement which has been effected on the face of the country within the memory of many still alive, by the skill and enterprise of the landowners, and the laborious industry and perseverance of the occupiers and tillers of the land.

The season of the year and the attractiveness of the district, as well as its easy access, will be certain to draw a large gathering of the members of the Society, and all interested in arboricultural pursuits; and every forester in the country should endeavour to join in these instructive excursions as often as circumstances will permit. It is decidedly to the advantage of the owners of woodlands that their foresters should occasionally visit the woods and plantations on other estates, to see and learn the various modes and systems of management in vogue, so as to apply them with effect, when found suitable, at home. The expense of the journey is but a trifle compared with the advantages likely to be derived; and employers will be acting generously and wisely in seeing that their foresters are provided with the means for joining in these arboricultural excursions now and again, to their mutual profit and general advantage.

On this occasion the central starting point will be Edinburgh, from whence the excursionists will proceed by the Caledonian Railway, from West Princes Street Station, by the ten minutes past seven train on the morning of Thursday, 5th August, to Dolphinton Station, a distance, as the crow flies, of about 20 miles, but considerably more by the circuitous route the railway follows. Arriving at Dolphinton shortly after 9 o'clock, conveyances will be waiting to drive the excursionists to Dolphinton House, where the business of the day will commence by inspecting the beautifully wooded policies, and the numerous plantations formed in recent years by the owner, John Ord Mackenzie, Esq., and which are thriving with remarkable vigour in this elevated region, some 1,000 feet or more above the level of the sea. The collection of conifers and other ornamental trees and shrubs, which are seen thriving at this high altitude, will form a special feature of interest to the visitors. Leaving Dolphinton, the party will drive for some miles through a beautifully wooded upland valley to Castle Craig, the seat of Sir William H. G. Carmichael, Bart., where some time will be spent in exploring the charming grounds and woods, in which are to be seen many fine examples of well-grown trees and shrubs, as well as other objects of much interest to the excursionists. Again proceeding on their way the visitors have a long but lovely drive before them, down the valley of the Lyne to its junction with the Tweed, then turning to the right up Tweedside, passing most of the way through a richly-wooded and well-cultivated country, embosomed in lofty hills with purple heath-clad tops, and their flanks well clothed with leafy woods and green pastures. Stobo Castle, the seat of Sir Graham Montgomery, Bart., is first reached, and here all the richness of sylvan beauty for which the district is remarkable is displayed in an eminent degree; after viewing and enjoying the beauties of Stobo, the drive to Dawick, the seat of Sir James Nasmyth, Bart., is but a short distance. The inspection of the many rare and beautiful trees and shrubs growing in the charming and well laid-out grounds around Dawick, will afford the excursionists a rich treat, among which they will be inclined to linger more than the allotted time will permit. Returning down the valley of the Tweed, past Neidpath Castle, a celebrated baronial pile of the Middle Ages, and one of the most massive and imposing of the feudal strongholds still extant in Tweeddale, the town of Peebles is reached, which will form the resting place of the party for the night.

Making an early start next morning the excursionists will visit the grounds and plantations of Kingsmeadows, the seat of Sir Robert Hay, Bart., about a mile from Peebles, returning in time to Peebles Station for the train to Eddleston Station, from whence they will pro-

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ceed to visit the plantations and policies at Portmore, the seat of Colin J. Mackenzie, Esq. Again betaking themselves to the railway, the party will travel by train to Pomathorn Station, from which they will proceed to view the extensive policies and plantations of Penicuik, the seat of Sir George D. Clerk, Bert., which will fully occupy the remainder of the day, the excursionists returning to Edinburgh, by train, in time to catch the evening trains for all parts of the country. Such is a brief sketch of the route which the excursion is intended to go over, and all who can spare the time to join in it are certain to reap both instruction and enjoyment from their visit to the beautiful policies and plantations, so generously thrown open by the owners to the visit of the Arboricultural Society.

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AT a meeting of the Scottish Meteorological Society, held in Edinburgh on the 25th ult., a most interesting paper, "The Influence of Climate on the Growth of Trees," was read by the eminent arborist, Sir Robert Christison, Bart., in which he ably pointed out the many advantages likely to arise from an accurate knowledge of the relation of climate to the growth of trees, and advocated the institution of an inquiry into the subject, in Scotland, by the Society.

A carefully conducted investigation of this important subject, extending over a series of years, would be of great benefit to the arboriculturist, as well as affording to science reliable data on a subject upon which considerable difference of opinion now exists. The influence of trees upon climate has been the subject of much laborious investigation, and the knowledge which has been obtained thereby has been of immense advantage in guiding the forest departments of many states in their plans for restoring or conserving a due balance of forests in their respective countries, and also of special assistance to science in calculating the best means for ameliorating the climate of arid and inhospitable countries. However, the reverse of the question—the influence of climate upon trees—has hitherto been treated as of minor importance; but to the practical forester who has to study how to produce the largest quantity of the most profitable timber from a certain area in a given time, the influence which the climate has on the growth of certain trees is a matter of the first consideration. In the widely varying climate of the British Isles, it is already well known that certain climatical conditions are highly beneficial to particular species of trees, which thrive most luxuriantly under them, while nearly allied species can only exist as stunted scrubs. Soil, aspect, and altitude, have often much influence in such cases; but no matter how good the soil may be, or however favourable the aspect and altitude, if the climate is unsuitable it is in vain to look for profitable results from trees which naturally cannot thrive in such a climate. Hence it is imperatively necessary for the planter to have an accurate knowledge of the climate, and the trees which will grow best in it, under certain treatment, before he can proceed to plant with any certainty of obtaining the best results.

In collecting the requisite information upon this important matter, meteorologists have it in their power to render great service to arboricultural science, and we trust that the eminently practical suggestions of Sir Robert Christison to the Scottish Meteorological Society will be widely adopted, and a series of returns obtained from all parts of the United Kingdom, under the auspices of recognised authority. By such means, a valuable addition will be made to our knowledge of tree life, and the various climatic influences which are beneficial, or otherwise, to certain species of trees.

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In our present issue appears the concluding portion of an interesting article on the important question, "Are trees injured or benefited by the decomposition of the prunings which may surround them?" Deviating at some length from the question as propounded in the title, and going into side issues somewhat fully, the intelligent author tries to establish a theory upon which we do not hesitate to say he will find few men of sound practical experience and scientific knowledge to agree with him. Examples of the evil of permitting dead or fallen timber, the *débris* of trees, and other rubbish, to accumulate and decay in the midst of growing trees, in our woods and plantations, are of such common occurrence, that it requires considerable hardihood to promulgate the opposite doctrine—that such depôts of mischief and injury are beneficial to the trees which grow in close proximity to them. The expense of clearing large areas seems to be erroneously magnified by those who object to ridding plantations of the rubbish which harbours and propagates insects and fungi pestiferous to trees. Nothing can be more fallacious; the larger the area to be cleared, the cheaper the rate per acre at which it can be done. If hands can be found to plant large tracts of country, it is simply a part of the duties of a forester to have them at command, in sufficient numbers, for its good management. The judiciousness and profitableness of the system is generally acknowledged, and is practised with success by many of our most intelligent foresters; the well-managed, clean, and healthy plantations of which they are in charge proving a source of much profit and satisfaction to the owners thereof. The best of our farmers find it highly profitable, and are always careful to rid their crops of weeds and noxious pests of every kind, and still more so is it necessary for foresters to be ever on the watch to detect the presence and prevent the ravages of pests of all kinds which prey on the trees they cultivate, because of the comparatively greater interests at stake, and the longer period which it takes for plantations to recover from injuries inflicted on them by noxious pests. In this, as in all other similar cases, prevention is better than cure, and every precaution which knowledge and experience has taught us should be judiciously applied to ward off attack as much as possible. Able and observant men wisely use these precautions, very much to their own credit and the profitable nature of the results obtained, especially so when the success of crops is involved of such value and permanent character as plantations of trees. One season's negligence may lay waste and ruin the growth of many years, and foresters cannot be too careful in watching the approach of such disasters, and employing every judicious means to prevent their occurrence.

# Are Trees Injured or Benefited by the Decomposition of the Prunings which may surround them?

BY D. McCORQUODALE, FORESTER, DUNROBIN, SUTHERLANDSHIRF.

(*Concluded from page* 85.)

SECOND.—Decaying rubbish is said to encourage the breeding of injurious caterpillars and beetles, and these we will consider by dividing them into the following four classes:—

1st. Those who principally feed on foliage, and we will take for our example *Lophyrus pini*, the pine saw-fly or caterpillar. Mr. McGregor, Ladywell, Dunkeld, told us with regard to them that they have for the last three seasons been devouring enormous quantities of foliage, and thereby doing much harm to the trees, and that this has been going on in a young plantation five miles distant from any other Scotch fir wood. Although he told us how he tried to destroy them, he said nothing of how he thought they came to be there in such great numbers, and so far from any other similar plantation. I think this same one was pointed out to me last winter, and there did not appear to be any rubbish lying about, being apparently too young to be thinned, nor did it appear to have succeeded an old wood of any sort.

It is to be hoped when the season for caterpillars now before us is over, that Mr. McGregor will kindly tell your readers how far his last season's naphtha treatment may have proved a cure.

Ten years ago scarcely a tree escaped them in a plantation of about a hundred acres here during two consecutive seasons. The third season there was not a vestige of them to be seen, and where they came from or went to is a mystery. This plantation was never thinned before they came and disappeared, there was therefore no decaying rubbish of any sort to influence them in any way. There were no caterpillars known to be within at least thirty miles of it. All the real injury done was just to retard the growth of the trees during the two seasons effected by them.

Four seasons ago *Pinus austriaca*, *P. laricio*, and common Scotch fir, growing in somewhat detached groups alongside the railway, were attacked by caterpillars and I am sorry to say they have been rapidly extending their depredations since then up till the end of last season. The trees so affected are from twelve inches to five feet high, growing chiefly on well-drained mossy ground. They are all otherwise quite healthy, and no fir trees or rubbish of any sort are within one half-mile of any part of them.

At a distance of five miles from the young plantation last mentioned and four miles from a forty years old Scotch fir one in which no caterpillars were ever seen, they began their destructive work last year in a two hundred acre Scotch fir plantation, and on trees about eighteen inches high.

As we hoped all those pests would leave us just as they did on a former occasion after a two years' visit, we made no attempt at destroying them until last season, when we tried crushing them with the hand, protected by a hedger's glove, as they lay in clusters on the branches. In order to kill them in this way we had to be at the expense of employing men, as boys' hands were too weak to kill them effectually. We tried the effects of lime shells crushed into powder, and also fresh slaked lime. The way we applied this was by employing boys supplied with a small bag each, such as is used for carrying small plants when planting, and into these we put the lime. Each boy then looked out for a tree with caterpillars, and on finding one he caught hold of the top of a branch with one hand, and with the other threw over the caterpillars and the foliage on which they fed, a little dusting of lime. This put an end to their depredations and stunned them, but was not so deadly as we wished, notwithstanding the caustic nature of both sorts of lime. We then applied paraffine much in the way Mr. McGregor did naphtha, and this killed them.

It is very strange that up to this date, July 10, where they were so numerous and did so much mischief during the last and three preceding years, they have not yet made their appearance; but where they appeared for the first time last year, we found them six weeks ago, and indeed on some of the very trees on which they were last year killed off, although not so numerous I believe as they would have been if we had not destroyed such great numbers of them. They were as carefully killed in the one plantation as in the other. How does it happen that they are all gone in the one in which they were most numerous and established for four years, and appear in the other in which they were so few and for only one season?

2nd. Those which feed on dead or decaying trees. We will take as our example the case of *Hylobius abietis* the fir weevil. These large beetles are found only where old fir plantations are, and they feed and propagate themselves among decaying tree rubbish, whether it be that of root, bark, or sawdust. The quotation in the Editorial Notes, page 820 of the April issue, from a report by Mr. McCorquodale, of Scone, gave readers a very correct idea of how very destructive they may be to newly-planted fir-trees, after an old Scotch fir plantation has been cut away; and how they can be all but stamped out by simply burning the rubbish and rank herbage, thus destroying themselves, their eggs, and food; and how as a further precaution after the young trees are planted, a layer of earth laid round them, packed hard, and made smooth, so that the few, if any, that might have escaped the fire, could not find any surface rough and loose enough, in which to screen themselves.

Although these insects may be numerous and very destructive to young plants, I am not aware that either Mr. McCorquodale or anybody else found them do any harm to any plantations, say five years old, or to young trees about three feet high, their habitat being the tree rubbish on the ground, where they can do no more harm than earth worms or other similar insects. It ought, therefore, to matter very little how numerous they may become after the trees reach this height, so long as the same crop occupies the ground, should it be for 200 years. Although so numerous in some plantations, there must be many old ones in which there are none at all, because if there were, young trees could not be found growing from seed shed by the large old trees in such great numbers in many old plantations.

Mr. Tivendale says regarding this beetle (see page 18 vol. iv. of the Journal), "The decaying branches of Scotch fir trees are not only a harbour for, but the origin of beetles." Are we from this to suppose that he is a believer in the spontaneous generation of plants and animals as the ancients were down to the end of the middle ages? Van Helmot, who died in 1644, went the length of describing the means of generating mice independent of the parentage principle. Although there are still very able men to be found who believe in spontaneous generation, the deeper the researches of the chemist and the microscopist the fewer will be their number, and the greater will be that of those who believe in parentage generation.

3rd. Those which feed chiefly in the growing timber of trees of which *Hylurgus piniperda* or the small pine beetle, is a fair type. This in some places destructive little insect pierces through the bark and timber of the season's growth when quite young, and there deposits its eggs, which, when hatched into worms, eat the pith upwards, increasing in size and strength as they go along, until full grown, when they enter their chrysalis state, in which they remain until late in spring, when they pass into the perfect beetle. These eat their way out to follow their natural round of instinct again if not by some means prevented. Trees so affected can easily be noticed in

May and June by the dead and withered appearance last season's shoots present.

Some maintain that trees previous to being attacked by this insect are always observed to be in an unhealthy state, indicated by the shortness of their shoots and the yellowish tinge of their foliage, and that the beetle selects the side and smaller shoots of these trees. I hold that the creatures' instincts and mode of living are such as to show that they would rather pass by unhealthy trees and attack the healthy ones, as these trees only could afford the healthy moisture required for hatching them, and sound feeding for their young when hatched. The most careful observers will find that in place of selecting the small and side shoots only, this beetle prefers the strongest, and therefore very often makes the leading shoots its choice.

My experience coincides with those who have observed them destroying trees from the time newly planted ones began to make vigorous growth up to the height of fifty feet, or about fifty years old, but not above this height or over this age. Twenty years ago some of our fir plantations from three to forty feet high suffered very much from this pest, but their ravages soon decreased until none could be seen; but how and where they went to are interesting questions. I saw a number of young trees that were affected last year, from one to five feet high only, in a plantation at least one half mile from any other fir trees. Decaying rubbish from prunings or the roots of old fir trees could not have caused these insects, because they were never thinned, and trees never grew where these are now growing.

Referring to your April issue, page 820, I must hold a different opinion to Mr. McCorquodale regarding "these beetles propagating in the decaying branches in legions, whence they ascend the trees and commit extensive ravages." *Hylobius abietis* do increase their species among decaying rubbish, and the mischief done by them is when in their weevil state, and the young weevils might be mistaken for the other when found among decaying branches, whereas the mischief done by the other is when in its larval state. The instinct of these insects, like those of higher animals, inclines the females when about to produce their young to lay their eggs where nature is best able to hatch, and feed their young when hatched. Now the *Hylurgus piniperda,* unlike the others, requires for its eggs a shaded place, moistened with the sap of a healthy growing tree, having its best food, the tree-pith, beside the young to nourish them so soon as they break through the egg and are able to eat. I would as soon expect to find the eagle's nest among the grass on the banks of a river, where wild ducks build theirs, in place of the lofty crag where the young eagles when hatched can with the least exertion try their strength of wing and imitate their parent in darting downwards on some unfortunate passing bird on which they mean to feed, as expect to find *Hylurgus piniperda* propagated among tree rubbish.

4th. Those who live on the sap of trees, of which the larch and pine bugs or lice are examples. This is perhaps the most destructive class of tree insect known in this country, being frequently found in thousands on trees infected by them. Not only do they weaken the trees by the amount of sap they suck out of them for their own nourishment, but in hot weather the trees bleed from the numberless holes they make, thereby retarding the growth, or killing them altogether as effectually as if barked. Mr. William Gorrie, in his able paper on the "Failure of the Larch" (see "Transactions of the Scottish Arboricultural Society," vol. viii.), informs us that the increase of the larch bug disease in Fife was most alarming in the three dry summers of 1800-1-2, but that from 1806 it began to decrease, until by 1815 it had almost disappeared. Mr. McCorquodale, of Scone, in his interesting paper on this disease in the second vol. of the same publication, calls attention to the serious ravages done by this insect during the four years 1838-42, and that since then they had, comparatively speaking, ceased. Both these gentlemen speak of this disease having been quite common among young larch plants in public nurseries during those periods.

Naturalists tell us that so very rapidly can the Aphides family, or plant lice class of insects propagate themselves under favourable circumstances, that nine generations may be propagated in three months, amounting to a total of 100,000,000,000,000,000. To form some idea of what this bewildering sum really means, let us suppose it possible to place them in a line and at the rate of 100 to the inch, or about 400 to the breath of one's hand. The sun is about 92,000,000 of miles from here, and this supposed line would reach it over 160 times. A man's thumb may cover a square inch, and let us suppose it covers 10,000 of these minute insects, the produce of one of which in one season might be so very great as to cover an area of 1,594,225 acres which is about double that of Ayrshire or three-fourths of Perthshire.

The preventative for the larch scourge which Mr. Gorrie recommended is to burn all the plants so affected in the nurseries. Now, if one of those microscopic eggs is in one season capable of producing a fraction of the above enormous number, and as these eggs may be by the score on plants without the nurserymen's knowledge, they may burn those they see the insects are destroying, and still have their other plants, with many of these eggs on, to be in that state sold to their numerous customers. Mr. McCorquodale tried to destroy them by the application of powerful solutions, but to no purpose. He then tried the effects of thinning and removing all dead branches from the boles of the trees, and found, after thus admitting plenty of light and air, that they recovered very much. On the authority of Mr. Raith the severity of this disease in 1800-1-2 was due to the warmth and dryness of these summers, and not to their cold and dampness. Now, if Mr. Raith's views are correct, Mr. McCorquodale's cannot be so, because, in proportion to the amount of light and air you let into a plantation in summer, you warm and dry the atmosphere, the very thing Mr. Raith said the disease was due to—we should say rather helped. The thinning of a crowded plantation may be at all times a benefit, and still of itself do nothing to prevent or even retard this larch disease. I never saw larch, even forty years old, suffer from this. Scotch fir suffer from it, though nothing like the same extent, up till the age of about fifteen years.

I am not aware that this class of insects were ever found propagating themselves among tree rubbish some distance away from the young, tender bark, thereby causing their newly-hatched progeny to encounter the difficulties of ascending some distance before they could get at their food.

It is doubtful if there are any large larch plantations in the country totally free of this insect at any time.

Third.—Cryptogamic plants are said to be injurious to forest trees, and to be hurtfully increased by the decaying rubbish which may surround them. If so, perhaps some one of your readers will kindly say where an example of such can be seen that cannot be traced to some more natural and reasonable cause. I almost invariably see moss and lichens growing on the north side of tree trunks, especially if they are old, but very little on the south side, often none; but I have as yet failed to see that it did the one side more harm than the other. Thick corky bark, with its millions of microscopic pores charged with confined air, is the best protection a tree can possibly have from the injurious effects of our changeable climate; and so long as parasitical plants penetrate the bark but *very little*, I think it a very wise provision of Nature to clothe the north or cold side of a tree with some lichens and moss to help to keep out the cold, so that the temperature of both sides of a tree may be made more uniform.

No doubt small-fruited trees suffer at times so severely from these parasites in damp garden soils as to have their branches rotting; but before this happened the bark may be enwrapped with a covering of twenty times its own thickness; and no doubt a tree having bark an inch thick, with a covering of twenty inches of ferns, moss, and lichens growing over it, might rot also; but who ever saw anything approaching to this, even on the oldest oaks in the dampest dells? Many years ago I saw a forester who so strongly believed in the injury done to trees by this class of plants that he got half-moon-shaped iron scrapers made, and was scraping off the fog and lichens of large old trees, and scraped off also large quantities of bark, and crushed and loosened much that did not fall down. He was, in fact, preparing the tree-trunk the better to grow these parasitical plants, reducing the tree's natural clothing on the cold side, and spending his employer's money, and all to no purpose.

Mr. Dunn gave a very good example of the baneful effects of parasitic fungi on the roots of live trees (see page 20 of your May issue), but unfortunately he is silent upon the state of the soil as to drainage, &c. If the soil was naturally of a dry nature, the old tree roots would make it still drier by keeping it open, and if the trees were kept so thin as to allow much sun and wind in through them, it would be enough to parch up the ground, leaving some of the tree roots so dry as to be positively inactive, and only kept moist by drawing moisture by capillary attraction from other parts of their roots, and if so, this would be cause enough for the fungoid infection, and when once it gets hold of the impaired vigour of the tree the growth would most likely go on gradually until it killed it. Mr. Dunn found that the chestnut and hornbeam grew well among all the roots of their neighbours, while the others intermixed with them were dead with fungi, just because they stood the drought better, and the fungoid, dying roots of their neighbours helped to feed them, and add so much more moisture to the soil. If the roots of trees thinned out of a plantation were examined in a warm, damp summer some time after being cut, most of them would be found with this fungi, and yet doing no harm to the growing trees which surrounded them.

In renewing the decayed timber flooring of an apartment which adjoined an outside wall, on which ivy grew vigorously, I found the roots growing along through the rotten timber sleepers to which the flooring was attached, which were embedded in soil, and these sleepers were one network of a fungi, similar to the one Mr. Dunn speaks of. As a proof that those roots suffered nothing from this fungi, one of them was traced along inside one of these sleepers to a length of eight feet, and quite sound. We have in our nursery young trees growing round an old tree stump surrounded with mushrooms, but without doing these trees the least injury.

Fourth.—Those gentlemen appear to think the expense they purpose incurring in all the clearances they recommend to be but a small matter; and that all the benefits accruing therefrom will be in excess of the cost; but this I fail to see, although quite at one with Mr. Philip in thinking that nothing looks more trashy than branches lying about in a plantation, especially if seen from the mansion house, or from pleasure walks and drives. Stones also look trashy, and, like branches, they should be buried out of sight only, which is a small matter when compared with the clearing out to some safe distance, and there burning tree rubbish, consisting of the roots and prunings of the thinnings, say of 200 acres annually. The careful grubbing-up of all the roots of trees thinned out from amongst those of the standing ones among which they are twined and interwoven, in place of leaving a good balance in hand after defraying the working expenses of each thinning, might, in many cases, accumulate to a sum too large for the crop at the final cutting to pay, not to speak of the capital first laid out upon it, and the yearly interest which that capital should produce, and the annual rent of the land for the time it lay under trees, thus leaving the unfortunate proprietor with every cause to regret having ever spent a penny on planting it, seeing it turned out such a loss, in place of a handsome gain; and that therefore plantations, after all, were, like flower gardens, expensive luxuries.

In a previous part of this article we have been examining the alleged injurious effects of having tree-decaying rubbish scattered about in woods, and found, as a matter of fact, that the so-called fœtid gases, though injurious to animal life, were to vegetation beneficial; we also found that with the exception of the weevil class of insects, there is no proof to show that any other produce themselves among decaying tree rubbish. We saw the tremendous powers insects possess for multiplying themselves, and how very destructive multitudes of them can be, and likewise, that although man may be able to save his garden from them at the expense of considerable labour, a forester who has to grow his hundreds of acres of forest trees to make money by, in a great measure must just helplessly look on and let Nature in her own mysterious way adjust her own balance, because if he treats his trees as he would his garden plants, it would be at a ruinous cost; and Nature does her work marvellously well. She has given the ichneumon family of flies, of which there are probably 3,000 species in Europe alone which lay their eggs both in the eggs, larvæ, and pupa of the herbivorous insects we are considering, and they help them through their various stages of development, while they, their victims, are destroyed, and their destroyers themselves pass into the open air, perfect flies, to perform the same destructive operations on other victims as the parents that gave them their being did the previous season. Although this class is perhaps the most destructive to vegetarian insects, there are many others who destroy them by the thousand.

It is doubtful if these flies could be the whole cause of the sudden disappearance of these caterpillars, because we had no opportunities of observing them closely enough; they might therefore be destroyed by another natural enemy of theirs, which is very probable, seeing the last season was so wet. We saw that there are no facts to show that cryptogamic plants were injurious to forest trees, at least in this country, though propagated among decaying tree rubbish; and we will now see how very useful some of the fungi class of them may be as insect destroyers, and may for all we yet know, more than anything else, account for the sudden disappearance of these insect pests from our trees. Fungi are propagated by spores, too minute to be seen without the aid of a microscope, and various kinds of them float about, vapour-like in the atmosphere, in millions, only waiting for suitable soil, or some other substance on which to grow. Under the name of fungi, botanists comprehend a great number of microscopic plants, growing upon other plants, and often on insects and animal substances, forming the appearance called mouldiness, mildew, smut, rust, bakers' and brewers' yeast, the potato disease, dry rot, &c., &c. —a spongy excresence in animal bodies, as proud flesh formed in wounds.

The species of British fungi number upwards of 2,450 kinds. So great are the fructifying powers of this class of plants that a mushroom has been known to shed 250,000,000 spores in ninety-six hours, and so rapid do plants of this order grow under favourable circumstances that one of the many millions of spores a puff-ball, when ripe, can produce has been found to grow the size of a large gourd in one night. Plants so improved artificially, from common wild flowers as to be of the utmost use to man, are sometimes very subject to fungoid diseases. For example, the attacks on our potatoes of murrain or blight in 1845, and again in 1875, propagated itself so very rapidly and disastrously all over Great Britain, as to have caused a loss of about £7,000,000 per annum, and then almost entirely disappeared as suddenly and as mysteriously as it came.

All sorts of parasitical fungi increase in numbers, and the destruction they perform increases in severity directly in proportion to the absence of sunlight, and the presence of heat and moisture the air contains which surrounds them, and indirectly in proportion to its dryness, coolness, and clearness. The potato disease, for example, was found to have increased with the greatest virulence in calm, warm, damp, muggy weather, and to be less when the weather was dry and clear.

Parasitical fungi, like insects and animals, are consumers of compound organic substances; and while green-leaved plants give off oxygen only in sunshine, they always, like animals, absorb oxygen, and exhale carbonic acid gas and water. We therefore should not feel surprised to find them directing their marvellous multiplying and destructive powers against all sorts of insects, by insinuating some species of themselves unto their tissues, and ultimately causing their death; and I cannot help thinking that when our forest trees' destructive insect physiology, and that of our parasitical fungi, are better understood, we will find that the sudden and mysterious decrease of those insects is chiefly due to the destructive powers of certain fungi, and if so, it may yet be found that one of the worst things that can be done to a plantation is to remove decaying rubbish. To show that I am not sanguine and imaginary on this subject, let me quote from Dr. Carpenter's "Vegetable Physiology," published in 1873:—

"Animals are liable, as well as plants, to the growth of fungi within their bodies. There is a species of wasp in the West Indies, of which individuals are often seen flying about with plants of their own length projecting from some part of their surface, the germs of these having been originally introduced probably through the breathing pores at their side, and taking root, as it were, in their substance, so as to develope a luxuriant vegetation. In time, however, the funguous growth spreads through the body, and destroys the life of the insect; and it then seems to grow more rapidly, the decomposing tissue of the dead body being still more adapted than the living structure to afford it nutriment.

"A very curious example of the growth of fungi within the living animal body has lately been detected, and the knowledge of it has proved of great importance. The silkworm breeders of Italy and the South of France, especially in particular districts, have been subject to a considerable loss by a disease termed muscardine, which sometimes attacks the worms in large numbers, just when about to enter the chrysalis state. This disease has been ascertained to be due to the growth of a minute vegetable of the fungus tribe, nearly resembling the common mould, within their bodies. It is capable of being communicated to any individual from one already affected, by the introduction beneath the skin of the former of some particles from the diseased portion of the latter; and it then spreads in the fatty mass beneath the skin, occasioning the destruction of this tissue, which is very important as a reservoir of nourishment to the animal when about to pass into a state of complete activity. The plant spreads by the extension of its own structure, and also by the production of minute germs which are taken up by the circulating blood, and carried to distant parts of the body. The disease invariably occasions the death of the silkworm, but it does not show itself externally until afterwards, when it rapidly shoots forth from beneath the skin. The caterpillar, chrysalis, and moth are all susceptible of having the disease communicated to them by the kind of inoculation just described; but it is only the first which usually receives it spontaneously. The importance of this disease to the breeders of silkworms led, as soon as its true nature was understood, to careful inquiry into the circumstances which favour the production of the fungus; and it has been shown that if the bodies of the caterpillars, which (from various causes) have died during breeding, be thrown together in heaps, and exposed to the influence of a warm and moist atmosphere for a few days (as has been very commonly the case), this fungus almost invariably appears upon them, just as other kinds of mould appear on other decaying substances; and that it is then propagated to the living worms by the diffusion of its germs through the atmosphere. The knowledge of this fact, and the precautions taken in consequence, have greatly diminished the mortality."

The notion of Dr. Hagau, Professor of Entomology in Harvard University, Mass., is that all sorts of insects may be killed by a suitable application of the yeast fungi, each cell of which is so small that it takes an average of 3,500 to make a lineal inch. Professor Balfour, in his "Elements of Botany," says that caterpillars are killed by fungi in Australia, and that "even man is liable to be attacked by them, and several diseases of the skin mucous membranes are caused, or at all events modified, by fungi."

It is to be hoped that what has been said upon this important subject will suggest further inquiry into what can be the cause of the sudden increase and decrease of insect pests, and also how far parasitical fungi may prove a preventive if not a cure.

**GIRDLING TREES.**—Usually a girdled tree soon dies, but W. H. Regan, of Indiana, U. S., writes to a contemporary that such is not always the case. A gentleman living near Indianapolis has a Scotch pine tree from which the bark was removed for a space of almost a foot, when about three inches in diameter. At this point the wood is as dry and lifeless as a table leg, but above, the top is healthy, making regular and thrifty annual growths, bearing and perfecting seed, and to all visible appearance as healthy as though nothing unusual was the matter with the tree. This condition has existed for years, and the growth above the girdled points has increased to more than three times the size of the tree below. This tree was girdled by the sapsuckers. Another is a tree of the same variety on a farm near Belleville, in Hendricks County, Ind., which was completely strangled by an iron ring, two and a half inches in diameter, being dropped over it some years ago. Below the ring, for several inches, the wood is dead and dry as though it had been in a dry kiln for years; above it is greatly enlarged, perhaps quadrupled in size and still alive, though declining.

# Forest Economy in Sweden.

BY AN ENGLISH RESIDENT.

(*Continued from page* 103.)

ACCORDING to the official report of the Forest Department for 1878 we find that the total area of the Crown forests at the close of that year amounted to 13,459,358 English acres, or about 15⅕ per cent. of the whole timber bearing area of the country. From these 13,459,358 acres we learn that only about 34,706,340 cubic feet of measureable timber were obtained in the year before-mentioned, or only about 2½ cubic feet per acre. The total income derived by the State from its forests was about £130,000, and the expenses amounted to about £40,000, showing a net income of £90,000, part of which was spent in the purchase of waste ground capable of bearing forest.

At first sight the result of the operations of the Forest Department for 1878 is disappointing, if we measure the value of the institution by its immediate pecuniary results. It is, however, scarcely fair to measure it by such a standard, and I apprehend that the truer gauge of its usefulness will be the answers it is able to give to the questions: Has the department so managed its own immediate domain—viz., the public forests—that it can point to these as an example to the private proprietors of forest management? And has the department so used the resources at its command as to infuse into the practice of the forest owners not only a higher standard of forest economy, but also to imbue the owners of waste lands capable of growing timber with the necessity of re-planting these lands if the threatened evils to the already severe climate of the country are to be avoided?

It is quite clear that to anyone reflecting on the subject the answers to these questions contain the key to the permanent prosperity of a country, the value of whose exports of timber totals more than that of all other products together. There is no doubt that the Swedish Government is now fully alive to the necessity of putting its forest domains under proper management at as early a date as possible, and that the Forest Department has striven, not unsuccessfully, for the last fifteen or twenty years to repair the neglect of centuries. In the south and centre of the country the State forests are being gradually got into some sort of order, but there are still immense tracts in the north that lie comparatively fallow, where, owing to the absence of means of transporting the timber, it is of next to no value. Special efforts are now being made by means of the building of dams, the blasting of rocks, and the removal of other obstacles in the rivers of the province of Norrland, as well as by the making of winter roads, to bring the districts referred to within the pale of the operations of the Forest Department. When these operations are complete there is no doubt the revenue of the department will increase three or fourfold within a generation.

With reference to arboriculture, Sweden may be divided into three zones, of which the southernmost, comprising the provinces of Scania, Halland, and Bleking, as well as part of the province of Smaland, may be classed as the beech region; the middle zone, comprising the whole of the centre of Sweden south of the Dal Elf, may be classed as the region where the oak and similar trees flourish; and the northern zone, where only pine and birch forests are able to withstand the rigour of the climate.

In the southern zone the proportion of ground under forest varies from ten to fifteen per cent. of the whole area, and is consequently barely sufficient for the wants of the inhabitants themselves. Beech (*Fagus sylvatica*) constitutes the principal timber supply, of which a portion is split by hand in a most wasteful fashion into staves, and exported to the herring and other fisheries on the coast of Norway. A further small portion is used in the different industries cut into various forms, but by far the greatest percentage is burnt as firewood near where it is grown, or exported for the same purpose to various ports in Denmark. I have been frequently surprised and grieved at the lavish way in which the peasantry of the south of Sweden use or rather waste their comparatively small reserve of good beech timber. There is another description of timber grown in the extreme south of Sweden called locally Afwen-beech (*Carpinus betulus*), which is especially useful for all sorts of farm utensils. The aspen, mountain-ash, and alder are met with frequently, but they do not occur in distinct woods of any magnitude. The forests of the south of Sweden have never recovered the ravages of fire, which, during the continuous struggles of the Danes and Swedes for the possession of the country in the sixteenth and seventeenth centuries, made the southern provinces little better than a desert. One passes large areas covered with dwarf bushes and heather, and woe betide the unlucky traveller who happens to have miscalculated his journey so that he is surprised on one of these heaths in a snow-storm and at night, where there are no friendly trees or hedges to mark the road or give shelter against the icy blast. I can assure my readers that one experience of the description referred to is sufficient to make the subject of it regard as a benefactor the man who plants even bushes by the roadside. Spasmodically efforts are made to reclaim these wastes to arboriculture, of which several successful examples are to be seen within a few miles of the town of Halmstad on the shores of the Cattegat, where many hundred acres of redwood (*Pinus sylvestris*) have replaced a heathery waste. The most conspicuous example of reclamation, however, which has met my eye is one which was undertaken by the officials of the Forest Department about fifteen miles or so from the small manufacturing town of Boras, where an area of waste ground, many thousand acres in extent and of such indifferent quality that "a crow would scarcely fly over it," as the north country saying is, is now covered with an extremely healthy growth of pine of from fifteen to twenty years old, and a most handsome investment of the money expended on it—so the head forester informed me a few years ago.

Although in the middle as well as in the northern zone, by far the most common description of trees occurring in the forests are red pine (*Pinus sylvestris*) and white pine (*Abies excelsa*), growing either separately or in conjunction with birch (*Betula alba*), yet to the south of the Dal river considerable plantations of oak (*Quercus robur*) are to be found, as for instance, one on the islet Wisingsö on Lake Wetter, of an area of about 1,000 acres. The larch (*Larix europæa*), and silver pine (*Abies pectinata*) have been largely imported, and may now almost be considered naturalized with us. On the before-mentioned island, Wisingsö (by-the-bye historically celebrated as being the seat of the Brahe family—the Medici family of Sweden—who did incalculable service, amongst other things, by employing learned men to translate the old Islandic histories and Sagas), and at Omberg a little to the north of this, as well as in Stockholm's Djurgard, several plantations of larch exist of considerable age, and all in a thriving condition. On a smaller scale, and in the centre of Sweden, the North American Weymouth pine (*Pinus strobus*), the hardy Austrian black pine (*Pinus Austriaca*), and the Cembra pine (*Pinus cembra*), from the North of Russia and the Alpine districts of South Europe, with its edible and nut-like fruit, have been tried with success. The *Pinus inops* has been also planted on the shifting sands of the South Swedish coast.

It was in many places in the centre and north of Sweden a very common practice, even as late as 20 to 30 years ago, for the peasantry to burn large tracts of forest for the purpose of obtaining a crop of oats. The trees were cut down and left lying on the ground until they were tolerably dry, when they were set fire to and everything burnt that would burn. The ashes left were then evenly spread over the ground and oats sown, when a good crop was usually obtained without further trouble. Frequently a fair second crop was got if the soil was reasonably deep, but after that the ground remained fallow for many years, until a self-sown crop of pine or birch made its appearance. In some cases the fire smouldered away for weeks, consuming everything that the trees had given off to fertilize the ground, with the result of unfitting it for producing anything but heath or the juniper tree (*Juniperus communis*) so common in the south of Europe. Incalculable damage has been done to the tree-producing power of the country in this manner, and it was not without difficulty that the Forest Department succeeded in putting a stop to it.

In the province of Norrland, where probably 75 per cent. of the area is unfitted for anything but the production of timber, and where timber limits 50 years ago had little or no value, the whole face of the country has undergone an entire change since 1850. Many of the peasantry, who, from considering their forest limits of no value whatever, as compared to their cultivatable ground, suddenly awakened to the fact that they had a source of revenue in the former of many times the value of the latter. The natural result took place, the peasantry neglected their husbandry and other pursuits, and betook themselves to the woods. Many of them, unable to grasp the change that had taken place, *let* their forest limits for a long term of years at a nominal rent, with *carte-blanche* right to the lessee to cut down what he thought proper during the period the lease ran. The effect of this state of things on the management of the forests may be imagined, and it will take a long series of years before the Forest Department is able by precept and example to eradicate the mischief done. That fortunes were made by sawmill owners out of the ignorant peasantry can be easily understood.

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LARGE CHESTNUT TREE AT TORTWORTH.—The following are the dimensions of the famous chestnut tree here, viz. :—Circumference, 3 ft. from the ground, 49 ft.; spread of branches from north to south, 86 ft. ; from east to west, 88 ft. These measurements were taken by myself about three weeks ago, and I can vouch for their correctness.—THOMAS SHINGLES, in the "*Garden.*"

BIG DECIDUOUS TREES IN AMERICA.—In Case's *Botanical Index* for April, the dimensions are recorded of several large deciduous trees growing in Indiana. The largest is a sycamore in the White River bottom, not far from Worthington. It is said to be 48 feet in circumference, and to have a solid trunk. At a height of 25 feet it branches into three or four limbs, one of which is estimated at more than 5 feet in diameter. There are also some gigantic chestnuts in Jackson County; the trunk of one of these measures 22 feet in circumference at 2 feet above the ground, and the height to the first limb is about 70 feet.

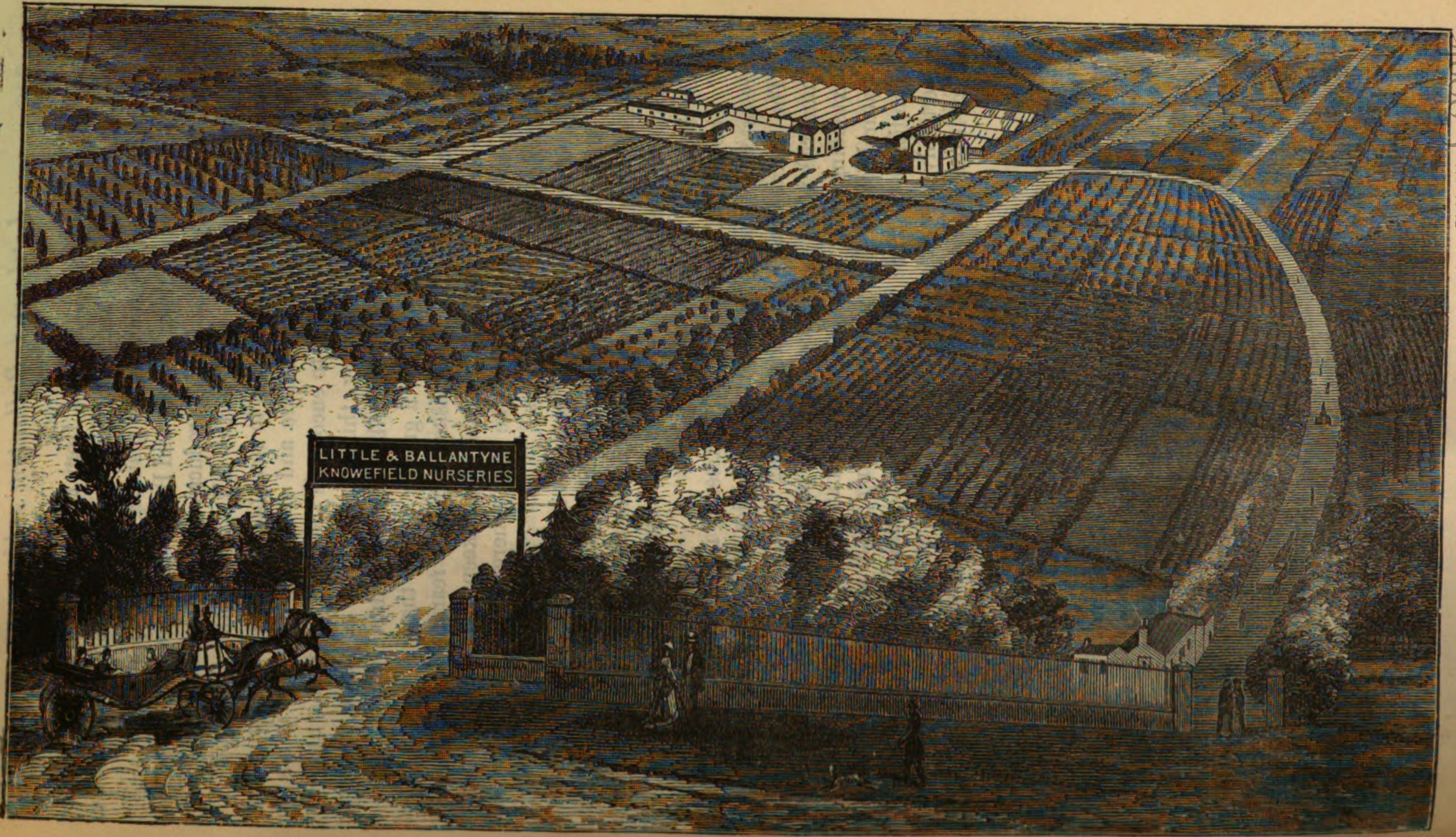
# Little and Ballantyne's Nursery, Carlisle.

We should not be doing justice to the many attractive objects which abound in the ancient city of Carlisle and its neighbourhood, whither we were recently attracted by the Royal Agricultural Show, if we omitted to notice the beautiful nursery grounds of Messrs. Little and Ballantyne, which skirt the road to Edinburgh and Glasgow, about one mile from the city, and form a prominent feature in the striking landscape when viewed from the picturesque village of Stanwix, which overlooks them.

These nurseries stretch out over an extensive area of about 130 acres, and have become distinguished under the good management of their present proprietor, as being among the best kept and most beautifully laid out nursery grounds in the United Kingdom.

Visitors will not regret having devoted a few hours to an agreeable walk through the numerous compartments into which the grounds are divided, each of them full of interesting examples of nursery cultivation; and the spacious gravel walks, extending to every part of the ground, have an irresistible charm, sufficient to lead one on, unconscious of fatigue.

The approach from the main entrance gate, and leading to the centre of the nursery, is about 15 feet wide, and is intersected with walks of corresponding width, diverging from each side, and leading visitors along broad parallel borders filled with tastefully arranged groups and interesting specimens of ornamental trees and shrubs of every description. Numerous beds of young seedling trees occupy a large space, and at once attract the attention and make it difficult to withdraw the eye from the refreshing appearance of millions of baby trees, all so bright and green, stretching away in a series of large beds, 40 feet long by 4 feet in breadth. Many thousands of these tiny young trees are sent out in their seedling state to the southern nurseries, where the climate and soil are unsuitable for rearing them, and, having been rendered hardy by exposure in their youth to a northern climate, they rapidly develop into fine healthy trees under the genial influence of the sunny south. It is well, however, to allow them to remain a year or two longer in the exposed nurseries in the north; and the visitor to Messrs. Little and Ballantyne's grounds will be surprised to see the extent of the numerous "breaks" (as they are called), con-



LITTLE AND BALLANTYNE'S NURSERIES, CARLISLE.

taining millions of forest trees, from two to three years old, planted in long, regular lines, and ready for removal when the fall of the leaf proclaims to the forester that the planting season has arrived.

The nurseries of Messrs. Little and Ballantyne are without exception most favourably placed for the production of trees and shrubs. They lie well exposed and open to the full force of the elements. The young trees have from the first to contend with wind, rain, and frost, and thus acquire a firm texture and sturdy habit, and it is also the peculiar nature of the soil to encourage the roots to become numerous and bushy, being the very thing the forester requires to secure success in transplanting. The business of a nurseryman is full of care and anxiety, perhaps to a greater extent than any other out-of-door occupation. The many risks he runs in rearing, in large quantities, so many varieties of trees and plants keep him constantly on the watch, and the changes of the atmosphere are noted with daily solicitude.

Farmers and gardeners are no doubt kept in like suspense, but the risk they run is less and more exactly known. The large capital necessarily sunk in a well-organized nursery, and its diffusion in so many different channels, makes the business of the nurseryman intricate and perplexing.

The celebrity of the Border Nurseries is increasing, and they are resorted to from all quarters for supplies of forest trees and shrubs. The extraordinary quantity of young trees reared in these and other nurseries is the best proof that the planting of waste lands is yearly extending. It is only too true that the supply of timber from natural forests is rapidly diminishing; and although the depressed condition of trade has at present slackened the demand, there is certainly no better investment of capital at the present time than to lay it out in planting waste and unprofitable land with trees.

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A TENANT CHARGED WITH STEALING TIMBER.—At Chelmsford, on 17th July, in the Crown Court, there was a remarkable case, in which the tenant of a farm was indicted for "unlawfully cutting down and stealing certain timber trees and pollards, consisting of oak, elm, and ash; and also cutting down other timber trees and pollards, with intent to steal the same, value above £5, the property of the Governors of St. Bartholomew's Hospital, between the 25th of December, 1879, and the 30th of April, 1880." And he was also sued in the Civil Court to recover possession of the farm for waste, but after the prosecutors had recovered a verdict in the action in the Civil Court, the criminal prosecution was withdrawn, with the approval of the learned Judge, Baron Pollock, who said it was the first case of the kind he had known or heard of.

# The Botanical Society of Edinburgh.

The last meeting of the Botanical Society of Edinburgh, for this session, was held on July 8th, when several matters interesting to foresters were discussed.

Sir Robert Christison, Bart., had been making observations on tree growth according to his new method, since 30th April last, especially on the growth of trees of the pinaceous order. In several specimens of the *Cupressus Lawsoniana* in the Royal Botanic Garden the girth had increased from an inch, to an inch and a tenth, while three species of the Hungary oak in the same establishment had increased at least four tenths of an inch in girth.

An oak tree thrown down by a flood near Cheltenham last autumn, was eighteen feet in girth at three feet from the ground; and the annual rings, according to the method of De Candolle, showed an age of not less than five hundred years.

The oak plantations at Craigiehall, near Edinburgh, were being much destroyed by an insect of the Aphis family. As this was very prevalent in the neighbourhood, it should be reckoned as a factor in causing the backward state of vegetation, together with the recent inclement seasons.

Isaac Anderson Henry, Esq., from personal measurements, confirmed Sir Robert's statement that the season had been peculiarly favourable to the growth of *Sequoia* and *Wellingtonia*.

Mr. France stated that this insect plague on the oak had prevailed in the district for the last three years, while Mr. Dunn had seen it on the oak, beech, elm, spruce, and other forest trees in vast numbers, and said that he had sometimes found the inner bark of the young wood in a discoloured state, such as could only be attributable to the late severe seasons.

Robert Hutchison, Esq., of Carlowrie, gave interesting details as to the prevalence of the disease, especially at Cleish Castle, near Kinross.

A large specimen of the fungus *Polyporus squamosus*, taken from an old sycamore tree in the Edinburgh arboretum, and weighing 10¼lbs. avoirdupois, was exhibited.

# The Royal Agricultural Show.

The ancient city of Carlisle was chosen this year by the Royal Agricultural Society for their country meeting; and a more picturesque and pleasant spot could hardly anywhere have been found than the situation of the showyard on the meadows known as the Sauceries and the Willow Holme, on the banks of the Eden and Caldew, under the shadow of the old castle. Twenty-five years have elapsed since the Royal Society last visited Carlisle; during that period the development of the Society and the increase in the number of exhibitors at the annual shows is shown by the fact that in the year 1855 fifteen acres of ground only were enclosed, whilst this year close upon seventy acres barely sufficed.

The success of the Royal Society, and the cordial support it has received from all classes interested in agricultural progress, is undoubtedly due to the well-defined and practical aims it has always pursued, and the great and varied advantages such a comprehensive association affords its members. There is, however, one branch of rural economy, which it will not be out of place here to mention, has not received, in the opinion of many, that attention and encouragement at the hands of the Society which its importance deserves; we allude to the department of arboriculture. Article VI. of the objects of the Society states that it will "collect information with regard to the management of woods, plantations, and fences, and on every other subject connected with rural improvement;" this of course must include forestry and estate management. These "objects" were drawn up some forty years ago, when the Society was established, and doubtless every effort has been made to carry out each one of them as far as possible, but this particular one to which we refer appears to have been neglected for others more popular and attractive.

In the official catalogue for this year we noticed it was stated that one firm of nurserymen would exhibit a collection of conifers and shrubs *if allowed!* The fact that there should be any doubt about the admission of specimens of trees into the showyard does not speak much for the encouragement of tree planting by the Royal Agricultural Society of England.

Great praise is therefore due to Messrs. LITTLE and BALLANTYNE for their enterprise in making such a good display of specimen forest trees at the Carlisle show. Visitors to the Kilburn show last year cannot fail to remember the tastefully laid out pinetum of this firm on the slope of the horticultural mound, which, covered with newly sown grass, stood out in refreshing relief from the surrounding sea of mud.

On the banks of the river Caldew, and the banks forming the right approach to a temporary wooden bridge which had been thrown across the river, Messrs. Little and Ballantyne had a capital display of grasses, trees, shrubs, and flowers. An artistically designed and arranged pinetum contained specimens of black, blue, golden, and silver yews, junipers, cypresses, biotas, thujas, libocedruses, cryptomerias, retinosporas, black Austrian pine, Scotch fir, Swiss pine, Pyrenese pine, spruces, Douglas fir, the giant Wellingtonia, and the "weeping" variety, which originated with this firm. A neat vandyked edging of young coniferæ formed a beautiful embroidery chain which surrounded the whole pinetum, and suggested some ideas that might be happily introduced into our usual and somewhat monotonous bedding-out arrangements in the flower garden. A collection of clovers, grasses, and comfreys, in a growing condition, was also a novel feature. In addition to the above Messrs. Little and Ballantyne's seed stand was on an extensive scale; and in every sense this firm appeared to be completely "at home" at Carlisle.

We were pleased to see that another firm of nurserymen were permitted to include a collection of conifers and shrubs in their exhibits. At Messrs. WILLIAM FELL and Co.'s stand amongst the specimens, which were in pots, we noticed, *Abies alba, A. Douglassii glauca, A. orientalis; Biota aurea, B. elegantissima, B. orientalis, B. semperaurescens; Cephalotaxus fortuneii; Cryptomeria elegans, cupressus Lawsoniana, C. gracilis, C. erecta viridis, C. nana, C. lutea, C. argentea. C. alba spica; Juniperus Chinensis aurea, J. glauca, J. Hibernica, J. prostrata, J. tamariscifolia, J. viridis pendula; Picea nordmaniana, Podocarpus Japonica, Retinospora ericoides, R. filifera, R. obtusa, R. obtusa aurea, R. pisifera, R. pisifera aurea, R. plumosa, R. plumosa aurea, R. squarrosa, R. leptoclada; Taxus elegantissima, T. Hibernica variegata, T. Washingtonii; Thujopsis dolobrata, T. dolobrata variegata, T. borealis, T. Standishii; Wellingtonia gigantea; Widdringtonia cupressoides.*

## GRASS SEEDS.

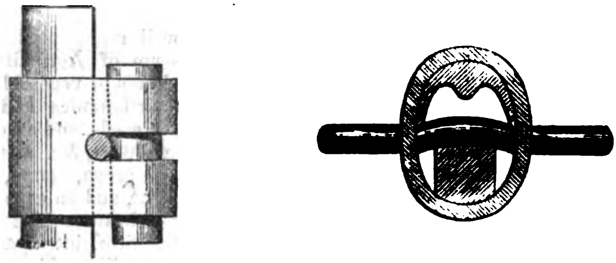
The leading firms of seed-growers were, as usual, well represented. Messrs. SUTTONS' imposing display was styled the Royal Museum of Agricultural and Horticultural Produce. Here were a thousand different kinds of vegetable, flower, farm and grass seeds in glass cases, labelled with both their botanical and popular names; several hundreds of farm, vegetable, and flower seeds, and an extensive collection of models of different varieties of vegetables, potatoes, &c. At Messrs. WEBB'S stand the central adornment was a large surface of green, young, growing grasses and clovers, in boxes of many square yards in extent, and on each side the compartments included fresh gathered vegetables, peas and beans, cauliflowers and potatoes, mangel wurzels, &c., all raised from seeds of the firm, interspersed with flowering plants, prominent amongst which was the golden lily. Messrs. JAMES CARTER & Co. introduced a novelty in the arrangement of their stand of grass-seeds for permanent pastures, &c. The seeds were exhibited in a series of cases, illustrating the system of suiting various mixtures to the geological formation of the soils. This was done with a view of bringing under the notice and familiarizing the farmer with the necessity of sowing such seeds as are adapted to the geological requirements of his land.

A small tent on the outskirts of the show-ground contained an exhibition of Canadian products. Sections of soil were shown in glass tubes to illustrate the general quality of the soil of Canada; and in a well-arranged case were samples of the ears of wheat, oats, and barley, almost all of them of unusual size, and with an appearance of being well filled. There were also a variety of seeds as well as young specimens of the maize plant, and well chosen samples of the different kinds of maize. The woods of the Canadian forests were represented in the raw state, as well as in the form of manufactured articles. A large frame contained polished samples of birch, white oak, walnut, ash, curly elm, bird's eye maple, red pine, yellow pine, whitewood and white pine. The purpose of the exhibition of these illustrations of the fertility and resources of the Dominion was made apparent by the gratuitous distribution of the tenant farmers' reports, and of pamphlets and papers descriptive of the country.

## FENCING.

Every year new forms of feet for fencing standards are introduced. Messrs. HILL & SMITH, however, state that after much experimenting they have not found anything superior to the old-fashioned forked foot, which is much easier to fix than many others, is solid, and takes a firm hold of the soil. The only fault of the forked foot is a liability to break off at the junction of the foot with the upright standard, where the weld is made; this is now obviated by an improvement recently patented by this firm. We have inspected a standard made on this new principle, and noticed that by a clever method the iron is doubled in substance at the shut or weld, thereby adding great strength to the standard. This new principle, we are informed, will be adopted in future in all Messrs. Hill & Smith's fences and hurdles. A very extensive display of continuous fencing, hurdles, field gates, tree guards, cattle troughs, and the specialities of this well-known firm were on view at their stand.

A new construction of continuous fencing called the "break-joint" has recently been adopted by Messrs. A. and J. MAIN & Co., by means of which additional lateral stiffness is gained. The horizontal bars in continuous bar fencing are usually all jointed at one standard; but by the "break-joint" principle the top bar is jointed at a different standard from the lower bars, thus distributing the joinings; moreover the joint standards are placed only nine feet apart instead of the usual fifteen feet, thus adding materially to the strength of the fence without increasing the cost. Reference to Messrs. Main's advertisement in this issue will make the construction quite clear to our readers. At this stand our attention was called to an improvement in fixing the well-known "Corrimony" fence. The requisites of an efficient "dropper" for a "Corrimony" fence are: non-resistance to wind and snow; lightness, combined with strength; the ease in taking off or putting on to the fence without slackening the wires; and a secure hold of the wires. The new patent "Leckmelm vice-grip" dropper is claimed by the manufacturers to meet these requirements. We give below a side and sectional view of this dropper, from which the method of fixing will be made perfectly clear to the forester. The variety of Messrs. Main's manufactures are well known to most of our readers, and a good selection was made in the fifty-nine articles on their stand.



Side View.

Section.

"LECKMELM VICE-GRIP" DROPPER.

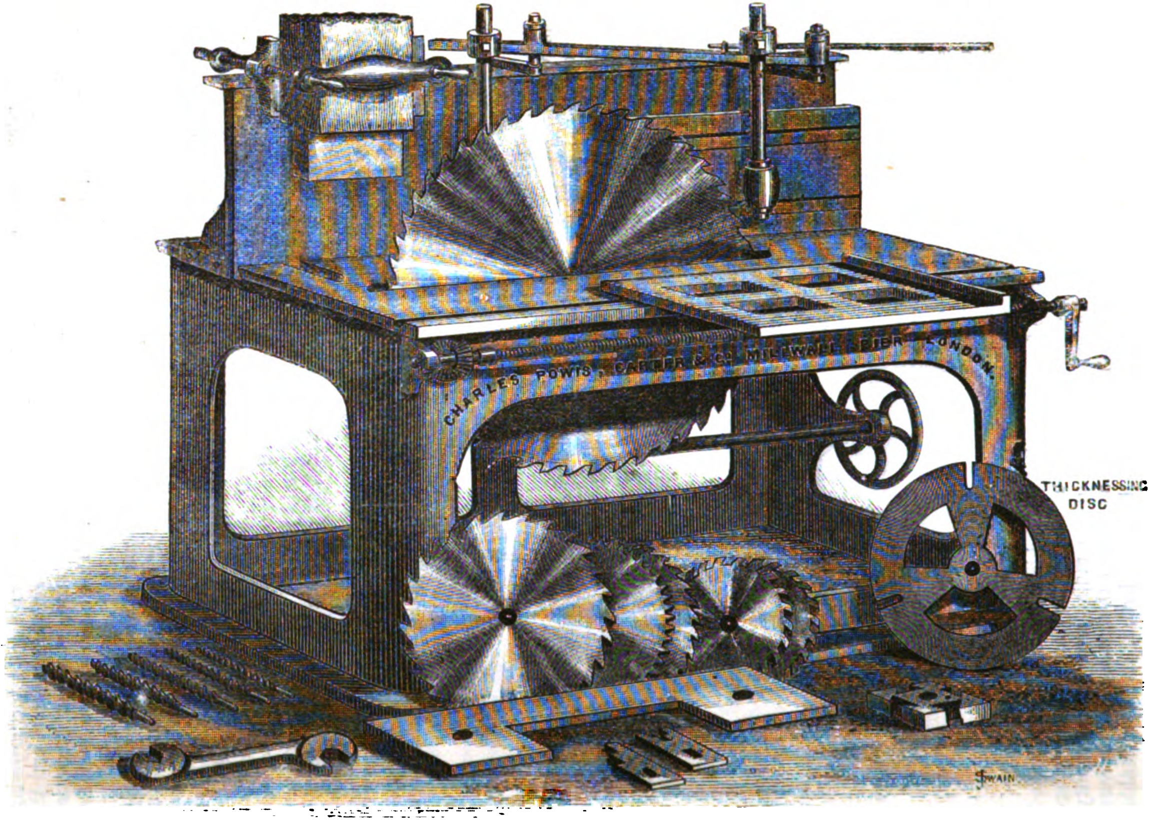
The specialities of the celebrated Sheffield firm of HYDES & WIGFULL (LIMITED) in the way of fencing, hurdles, tree guards, netting, &c., were well represented, but we did not observe anything new in principle or that calls for special observation. This firm has gained a reputation for good substantial work, and from the specimens we saw at Carlisle they strive to sustain the reputation.

Mr. R. S. MONCASTER exhibited his patent continuous iron fencing, tree guards, hurdles, &c. The principle of construction adopted by Mr. Moncaster was fully described and illustrated in an account of the Royal Show last year (Vol. iii., p. 262).

Messrs. FRANCIS MORTON & Co. (LIMITED) occupied two stands, at one of which were arranged fencing of various patterns, field, avenue, wicket gates, hurdles, &c., and at the other their patent galvanised corrugated roofing on iron supports for hay barns, &c.

## WOOD-CUTTING MACHINERY.

Messrs. CHAS. POWIS & Co., as usual, had a good display of wood-cutting machinery both in motion and at rest. The improved estate joiner and carpenter manufactured by this firm is illustrated on the opposite page. This machine has been especially designed for general wood conversion on gentlemen's estates, and is an exceedingly useful machine, capable of doing a variety of work; the frame and table top being cast in one piece, great strength with portability is obtained. It will take saws up to deep 15 inches, and plane any thickness by means of a disc. It will cut tenons and shoulders at one operation with patented discs, without setting out. It will also bore, rabbet, tongue, groove, and do nearly every operation required in joinery. Timber of any length may be converted into doors, sashes, floor-joists, floor-boards, match-boards, skirtings, mouldings, &c. For general jobbing work, such as sawing out, mortising and pointing posts and rails, ripping out fencing, cross-cutting firewood, sawing square blocks for paving, &c., it is invaluable. The saw spindle is of sufficient length to take two or more saws, and is made to rise and fall, and runs through long gun-metal bearings.


CHARLES POWIS, CARTER & Co. MILLWALL PIER, LONDON.
THICKNESSING DISC
SWAIN

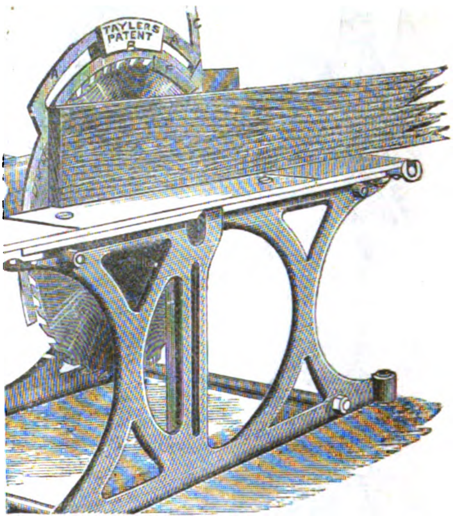
MESSRS. CHAS. POWIS AND CO.'S ESTATE JOINER AND CARPENTER.

A combination machine, called the Patent Joiner "Universal," was shown in motion, by Messrs. Chas. Powis & Co. At this machine it is possible for three men to work simultaneously without interference with each other. One can do sawing, tenoning, grooving, or rabbetting ; another planing and moulding ; and a third morticing and boring. The saw spindle is placed perfectly independent of the moulding apparatus, each spindle running in separate journals. The saw table is adapted for cross-cutting, and the spindle rises and falls for grooving, rabbetting, &c. The moulding table is fitted with self-feeding motion, and the work may be fed through at from 20 to 30 feet per minute, and can be varied according to the nature of the wood under operation. This machine was exhibited at the last Paris Exhibition and gained a medal.

The circular saw is one of the most useful inventions in wood-working machinery, and compared with the hand-saw will get through an amazing quantity of work ; but to the operator, if this saw is unprotected, it is very liable to cause accidents. Clever contrivances have from time to time been invented to avoid these dangers, but they have all to a more or less extent impeded the worker. Attention has recently been called to the necessity of providing an efficient guard or protector to circular saws, and several inventions are now before the public, each of which has its merits, and either of them would prevent many of the frequent accidents arising from the recoiling of the wood, or the operator coming in contact with the saw whilst in motion.

At Messrs. Robey & Co.'s stand we noticed one of these inventions, named Tayler's Automatic Safety Shield. By reference to the accompanying illustration, which shows the wood being cut under the shield, and passing out at the back, the following description will be clearly understood :—

A is the shield, a metal plate of the same thickness as the saw, moving concentric with it by the attachment at B, impelled by contact of the wood to be cut with the projection C ; the wood, when cut, passing respectively on either side of the shield, which, when thus released, is brought to the normal or starting point by a spring ; a tee-bolt and slot admit of raising or lowering to suit the wear or exchange of different saws. F is a plate affixed to the side of the shield to protect the workers' fingers. The shield can be suspended by a bracket from the table over the saw.

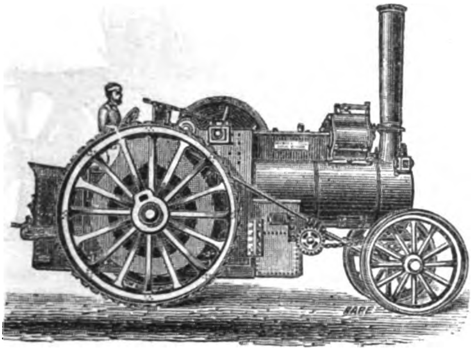


TAYLER'S AUTOMATIC SAW SHIELD.

A working model of a saw-guard, invented by Mr. J. B. Lakeman, Government Inspector of Factories, was exhibited by the manufacturers, Messrs. R. Garrett & Sons, of Leiston Works. It consists of three pieces, namely—the mortise-plate secured by three bolts to the fence ; a radial arm, which is secured and adjusted vertically into the mortise-plate by means of nut and collar ; and the covering-plate, which is secured and adjusted laterally into the radial arm, in conformity with the adjustment of the saw-fence, by means of the thumb-screw. Where several saws of various diameters are used in the same bench, it is advisable to have two, or perhaps three, covering plates, graduating in size to cover the whole series of saws. The apparatus, as described, is in its mode of fixing exceedingly simple. It is to be recommended on account of its simplicity, its cheapness, its immovability when fixed, and for its perfect freedom from being obstructive to the sawyer.

## ROAD ENGINES.

The road locomotive or traction engine is now used so universally, and for such a variety of purposes, that every one is familiar with its capabilities. For hauling timber and conveying it on turnpike roads from the woods to the saw-mill or railway station, it is undoubtedly the most economical agent, and is extensively used for that purpose on large estates. Many of the large engineering firms now build these engines and adapt them to the various agricultural requirements, such as thrashing, straw cultivation, traction on roads, &c. From the numerous exhibits at the Royal Show we have selected two, which we here illustrate, both made by eminent firms, who have made the manufacture of these engines their special study for many years.

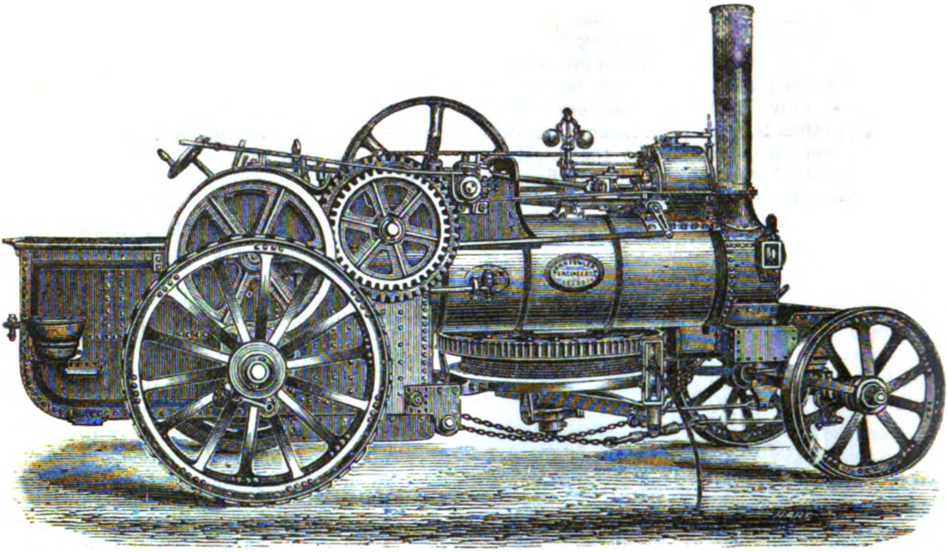


AVELING & PORTER'S ROAD ENGINE.

Messrs. **Aveling & Porter** of Rochester, are well known to build agricultural and road locomotive engines, the characteristics of which are simplicity, strength, durability, and economy of working.

In the road engine of this firm the cylinder, mounted on the forward part of the boiler to prevent priming, is surrounded by a steam jacket, and takes the steam dry from a dome in connection with the jacket. Instead of the customary cast or wrought iron brackets, which have to be bolted to the boiler, the side plates of the fire-box are extended upwards and backwards so as to provide brackets, which carry the crank-shaft, counter-shaft, and driving axle bearing in one plate. The whole of the crank and counter-shaft gearing is arranged to work between (instead of outside) the wrought-iron brackets, and the fly-wheel is fixed close to the crank-shaft bearings. The pinions for the two speeds are keyed fast upon the crank-shaft, instead of sliding upon "feathers," which are a constant trouble on account of their working loose. The intermediate shaft is fixed, and serves as a stay to the side plates, and the sliding-sleeve, which carries the spur-wheel and the fast and slow speed pinions, revolves on it. The gearing is of crucible steel, and the teeth are shrouded. The driving-wheels are of large diameter and width, in their section and measurement conforming to the requirements of the new (1878) Act of Parliament. They are fitted with compensatory motion for turning sharp curves without disconnecting either wheel. The engine is geared for two speeds, and is steered from the foot-plate.

Messrs. **John Fowler & Co.**, of Leeds, have manufactured traction engines for thirty years past, and have therefore great experience in the business. The engine we illustrate on the next page is one of their self-moving engines with winding drums. The engines of this system are made of 6, 8, 14, 16, and 20-horse-power. They are constructed with single steam-jacketed cylinders, and are provided with steam domes. The road gear is constructed of spur wheels, and made of the best crucible cast steel. The road wheels are wrought-iron, from 16 to 24 inches wide, and at a cost of 30s. per inch, the wheels can be made to any width that the class of soil the engines have to work upon may require. The engine has two travelling speeds, and is available as a traction engine, and can be used for any agricultural purpose, such as thrashing, pumping, grinding, sawing, or any operation of the kind. The power is conveyed to the winding drum by an upright shaft from the crank-shaft. The winding apparatus consists of a horizontal drum, which, by means of patent coiling gear, winds and unwinds the wire rope uniformly without any attention from the man in charge. This is done by a self-acting lever, which carries two vertical guide pulleys, moving slowly up and down, and freely swinging round the drum into any position at which the rope has to work. Thus all undue strain on the rope, as well as on the apparatus, is avoided. For hauling timber from the woods, where the engine cannot travel, this winding gear is very efficient.



J. FOWLER & CO.'S AGRICULTURAL TRACTION ENGINE.

It does not come within our province here to enter into any description of the excellent show of stock that was exhibited, but which our readers will already have learnt from the many good accounts which have appeared in the agricultural press, surpassed, in some departments, both in quality and quantity the exhibits of former years.

As a whole the show must be pronounced a success, and but for the weather—than which nothing could have been more dismal and desponding—we are sure that the energy of the local committee, and the manifest desire of the good people of Carlisle to attract visitors, combined with the magnificent railway facilities which the city offers, would have secured such an attendance as even the favoured "Royal" is not accustomed to.

THE HEMLOCK SPRUCE.—There is, or was, some twenty-nine years back, a fine specimen of this in one of the woods at Bowood, where the soil and situation evidently suited it, as it was in robust health and feathered down to the ground with branches. When seen in this condition it is unquestionably one of the most ornamental of all the coniferæ, its graceful pendulous habit and the great contrast between the deep green of the upper and the silvery under part of its foliage rendering it at all times a striking object. Why we so rarely see the Hemlock Spruce good in England is because the sites for it are not well chosen; it is a tree that requires some amount of shelter, and a very deep moist root-run where the soil is loose and open. Although it forms large forests in Canada, Nova Scotia, and the older settlements of North America, it attains its greatest size at the foot of the higher grounds, from which it receives a plentiful supply of water, and enjoys a continuously damp atmosphere. In the sandy flats of the same country it refuses to thrive, and both there and in some parts of the Hudson's Bay settlements it is a mere scrub. The one at Bowood at the period referred to must have been at least 70 ft. high, and if standing now is, no doubt, one of the best in the kingdom.—S. D., in the *Garden.*

FELLOWS' LIBRARY

# The Western United States as a Field for Emigration.

BY JOHN B. SMYTH, FREMONT Co., IOWA, U.S.A.

HAVING tried to interest your readers a little by giving them from time to time an account of my travels in America, it might not be out of place on my part still farther to give a description of the country and the habits and customs of the people, and the advantages of the country as a field for emigration, especially for those engaged in agriculture with small means, or, in other words, for the agricultural labourer. First, then, the facilities offered to the emigrant. Owing to the great extent of country unoccupied the emigrant has plenty of choice where to locate, and he need not be in any hurry in coming to a conclusion. If he has a little money he can look over the country and see and inquire as to this or that; in fact, he can gather all the information he wants from the surrounding people, for, without exception, they are always anxious and willing to give all the particulars they can, with the object of trying to get you to locate.

If you wish to look over the country you may take the train into the interior, getting a return ticket at a cheap rate from the railroad companies. If after seeing the land you decide on making a purchase, immediately on payment of the first instalment you are allowed a rebate of the whole amount of the fare you have paid. If you do not make a purchase you have still the advantage of the cheap ticket. All lands are sold either on a credit of from five to ten years, or for cash in hand, at the option of the purchaser, with interest from six to eight per cent. on the unpaid capital. Any one who prefers to buy on time receives a contract duly executed, which sets forth in detail the conditions of the transaction. Immediately after the purchaser has made his payments as stipulated, then and there a deed for the land occupied by him is granted. When sales are made on credit, one-fifth of the purchase-money with interest for one year at the rate of six per cent. per annum on the unpaid amount is required at the time of making the contract. The second payment one year hence is interest only. The remaining payments become due at the end of the second, third, fourth, and fifth years; each payment includes one-fifth the purchase price, with interest in advance on unpaid balances thus:—

| PAYMENTS. | PURCHASE PRICE. | | INTEREST. | | TOTAL. | |
|---|---|---|---|---|---|---|
| | Dols. | cts. | Dols. | cts. | Dols. | cts. |
| 1st payment made at date of sale ...... | 40 | 00 | 9 | 60 | 49 | 60 |
| 2nd ,, 1 yr. after ,, ,, | ... | ... | 9 | 60 | 9 | 60 |
| 3rd ,, 2 yrs. ,, ,, ,, | 40 | 00 | 7 | 20 | 47 | 20 |
| 4th ,, 3 yrs. ,, ,, ,, | 40 | 00 | 4 | 80 | 44 | 80 |
| 5th ,, 4 yrs. ,, ,, ,, | 40 | 00 | 2 | 40 | 42 | 40 |
| 6th ,, 5 yrs. ,, ,, ,, | 40 | 00 | ... | ... | 40 | 00 |
| Total payments made .................. | $200 | 00 | $33 | 60 | $233 | 60 |

It will be seen from the foregoing table that the price is almost within the reach of all, yet 12½ per cent. is deducted from the purchase price for all cash. Consequently if you buy 40 acres of land at 5 dols. per acre for cash, the whole amount would be 175 dols., whereas on the credit system at 6 per cent. it would cost 233 dols., one dollar being equal to four shillings sterling. Much of the land is level and beautiful to look upon. If the immigrant inclines to go west he can have a grant of land from Government, or, as it is called, he can obtain a *homestead.* Any man after he is twenty-one years of age can obtain a homestead with from 40 to 160 acres, provided he live upon it, making it his home. This he has free of taxes until the end of five years, when if he has cultivated a portion of the same he can, by proving so, apply to the land office, when he will receive a title to said lands. Over and above this, Government also grants what is called a timber claim to any one above twenty-one years of age, whether male or female, but then you are bound to plant one-sixteenth part of the whole. Any party making an entry of 160 acres is required by law to break or plough five acres during the first year and five acres in addition the second year. On the first five acres broken, he is required to raise a crop, and by the third year is required to plant timber, or sow seeds or cuttings. And on final proof he must show that not less than 2,700 trees were planted on each acre, and at the time of making such proof there must be growing 695 living and thrifty trees to each acre. These principally apply to the States of Nebraska and Kansas, both of which are fast settling up, as shall be shown by statistics recently collected.

If we look still farther, and examine the States of Minnesota and Dakota, two large territories which are destined at no distant day to become a wealthy and productive country, reading the statements of those who have travelled over these places just recently, and are good judges of land, one must see at a glance that it is a very fertile country. The surface characteristics of this vast body of land may be described as constituting a high rolling prairie. It is not in any sense monotonous, but beautifully diversified, so that almost any conceivable variety of surface can be found within its limits. It is traversed in all directions by rivers, dotted with small lakes, which afford every facility for stock farming where that form of agricultural industry is preferred. The soil is as good as any that can be met with, and what is already under cultivation proves to be very fertile, and well adapted to grow any kind of crop. It consists of a dark, rich, and somewhat sandy loam, varying in depth from two to five feet, underlaid with a clay subsoil, and is neither liable to suffer from drought or from excessive moisture. The range for the stock farmer in this country is practically unlimited. The native grasses are rich and nutritious conspicuously among which is a variety known as the "blue joint," which is held in high repute by stock farmers, as cattle and sheep can be raised and fatted for the market upon it alone, and with no other expense than cutting and curing the hay which these prairies yield in great abundance. It is also said that the climate and soil of Minnesota are peculiarly favourable for the raising of sheep, the atmosphere being pure, dry, and invigorating. From reports recently published this is said to be the best wheat-raising State in the Union, and in many instances the farmer has been known to pay for his land from the profits of his first wheat crop. However, this is not generally the case. No fences are required here, as by law all live stock are required to be constantly attended by a herd or kept in enclosures. The planting of trees is also encouraged by the Government, by giving to every cultivator of timber to the extent of ten acres, one quarter of section of land, or 160 acres, and further by some of the counties in the State a payment of a bounty of 400 dols. per annum is made for each acre of healthy growing timber. The supply of timber for fuel is one of the standard questions in this country, and doubtless is one of very grave importance. In some of the Western and Southern States it must soon become a scarce commodity, but so far as applies to this territory the wood supply is ample.

If you start from the head waters of the Desmonies River, there is what is known as the Big Woods. This is a tract of magnificent timber—"hard wood," stretching in a north-westerly direction for many hundred miles (the exact number I do not know), and some fifty miles in width, and from this source alone an abundant supply can be obtained for an indefinite length of time.

The educational interests of this vast continent are such as will warrant that no one need be without education, and that at little or no expense. The State has organized a plan that all roads are running east, west, north, and south, and each section of land of one square mile is bounded by a road. In each township two sections are donated to the State by the General Government for school purposes, which amounts to one-eighteenth of the whole territory. (Each township is six miles square, and contains thirty-six sections of 640 acres each.) The money arising from the sale of these lands constitutes a permanent school fund, and must be kept intact for ever by the laws of the State. The interest arising from this source aids materially in sustaining and supporting the schools in each district, so that taxation for school purposes is almost unnecessary. Provisions for sustaining the schools, the formation of districts for the same, and the building of schoolhouses, are matters that are receiving careful and earnest attention in almost all the Western States, and none are allowed to suffer for want of educational advantages.

The following statistics I have been favoured with from a gentleman in Chicago, who is much interested in the emigration scheme, and these he has obtained mainly by correspondence with the auditors of the different States named. This gentleman is one of a party who are at present trying to organize a plan to bring emigrants right over from the old country and carry them by the railroad lines direct to their destination in Minnesota or Dakota, at the lowest rates. On their arrival an agent is appointed to conduct them over the ground, and as soon as the emigrant fixes upon his place of location, the company assists him in the building of a house for himself and family, and in order to secure their own outlay, take a mortgage on the land for the amount at six per cent. interest. This certainly will be a great benefit to the man going west with limited means, in so far that it will assist him to brave the hardships of pioneer life. Many have already gone west almost entirely destitute of means, but have nobly overcome all these hardships, and are now among the most influential and well-to-do citizens of the States. Still the reverse is not unfrequently the case, as many agents have gone to the old country and held out such facilities as have induced many with very limited means to emigrate; and on arrival at their destination they got discouraged, homesick, and withal discontented, because they had not the courage to face the hardships of pioneer life, and with little capital, and less tact, their whole being becomes filled with disappointment.

I submit the following tables, showing respectively the increase of property and the increase of population in the different States named for the twenty years prior to 1870; also the number of miles of railroads then made, together with the increase for the last twenty-five years, together with what is considered about the centre of population.

"Pursuant to a request to furnish certain statistics which I have obtained mainly by correspondence with auditors of the various States named, I take pleasure in submitting the following.

"This table shows the increase of property in the States and for the time therein named:—

| | | | Increase. | |
|---|---|---|---|---|
| Nebraska ... | 10 years | 20,692,222 | 74,178,645 | 3½ fold. |
| Kansas ... | 16 „ | 24,737,563 | 133,832,316 | 5½ „ |
| Missouri ... | 22 „ | 83,129,359 | 600,777,361 | 7½ „ |
| Minnesota ... | 18 „ | 41,876,336 | 218,856,774 | 5 „ |
| Illinois ... | 26 „ | 119,868,336 | 1,001,125,110 | 10 „ |
| Wisconsin ... | 25 „ | 27,647,264 | 352,815,635 | 13 „ |
| Ohio ... | 26 „ | 439,876,340 | 1,597,469,966 | 3½ „ |
| Michigan ... | 20 „ | 137,668,009 | 630,000,000 | 5 „ |

"This table shows the increase in population in the States named for the twenty years prior to 1870:—

| | | | |
|---|---|---|---|
| Illinois ... ... | 1,688,421 | Increase, | 3 fold. |
| Indiana ... ... | 602,221 | „ | 1⅘ „ |
| Iowa ... ... | 1,001,806 | „ | 6 „ |
| Michigan ... ... | 786,405 | „ | 3½ „ |
| Minnesota ... ... | 433,629 | „ | 82 „ |
| Missouri ... ... | 1,039,251 | „ | 2⅝ „ |
| Ohio ... ... | 684,931 | „ | 1⅕ „ |
| Texas ... ... | 605,987 | „ | 4 „ |
| Kansas ... ... | 364,399 | „ | 3 fold in 10 years. |
| Nebraska ... ... | 122,993 | „ | 5 „ „ |

"This table shows the increase of railroads in various Western States for the last twenty-five years:—

| | | | | |
|---|---|---|---|---|
| Ohio ... ... | in 1855 had | 1,500 miles; | in 1878, | 4,987 miles. |
| Michigan ... ... | „ | 462 „ | „ | 3,564 „ |
| Wisconsin ... ... | „ | 320 „ | in 1879, | 2,896 „ |
| Illinois ... ... | „ | 367 „ | „ | 7,478 „ |
| Nebraska ... ... | „ | none | „ | 1,500 „ |
| Dakota ... ... | in 1872 had | none | „ | 700 „ |
| Kansas ... ... | in 1855 had | none | „ | 3,000 „ |
| Iowa ... ... | „ | 73 „ | „ | 4,721 „ |
| Total ... ... ... ... | | 2,722 miles. | | 28,337 miles. |

"In 1790 the centre of population in the United States was a point about two miles from the city of Baltimore. This centre of population has travelled westwards since that time upon a line passing through Parkersburg, Virginia, as follows:—

From 1790 to 1800, 41 miles.
„ 1800 „ 1810, 36 „
„ 1810 „ 1820, 50 „
„ 1820 „ 1830, 39 „
„ 1830 „ 1840, 55 „
„ 1840 „ 1850, 55 „
„ 1850 „ 1860, 81 „
„ 1860 „ 1870, 42 „
Total .. ... 399 miles.

"The centre of population must now be near the line dividing Ohio from Indiana.

(*Signed*) EDMUND GWILT."

It will be seen from the foregoing tables that the increase of property, &c., in the United States for the last few years has been something enormous. And I myself, after travelling many hundred miles over this vast continent, am convinced that its industry is only in its infancy, as the products are increasing year by year. I further believe that the land at present under cultivation is capable of producing much better crops than at present if the science of agriculture were only a little better understood. The majority of agriculturists here blindly follow each other, without any thought whatever as to the future result. Indeed, it would strike the reflective mind with much surprise to see the crops raised with so little attention given to them. On the same area the crops can be easily increased—to what extent I cannot at present say, but there is a fine opening here for him who can "make two blades of grass grow where only one grew before." And I think that such will be the case in America at no distant day.

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GIGANTIC TREES IN TASMANIA.—The following account of some large trees in Tasmania is from HENFREY'S short-lived *Botanical Gazette*, 1849—1851. It is the substance of a letter from the Rev. THOMAS EWING, of Hobart Town, to J. GOULD, ESQ. :—

"Last week I went to see two of the largest trees in the world, if not the very largest that have ever been measured. I had heard of them in 1841, and I think I mentioned them to you when in England. The person who found them has forgotten their whereabouts; but I had a man out for three days in the forests in the direction indicated, and on the third he came in to say that he had re-discovered them and I started with a party of five to measure them. They were both on a tributary rill to the North-west Bay River, at the back of Mount Wellington, and are what are here called Swamp Gums; but I do not know the specific name. One was growing, the other prostrate; the latter measured to the first branch 220 feet; from thence to where the top was broken off and decayed 64 feet or 284 in feet in all; so that, with the top, it must have been considerably over 300 feet. It is 30 feet in diameter at the base, and 12 at 220 feet or the first branch, and to that distance only would, from the stem alone, turn out more timber than three of the largest oaks mentioned by LOUDON, with their branches. We estimated it to weigh with the branches 440 tons. The standing giant is still growing vigorously, without the slightest symptom of decay, and looks like a large church-tower among the puny sassafras trees. It measured at 3 feet from the ground, 102 feet in circumference, and at the ground, 130 feet. We had no means of ascertaining its height, which, however, must be enormous. I measured another, not 40 yards from it, and at 3 feet from the ground it was 60 feet round. I am sure that within a mile there are at least a hundred trees growing which are 40 feet in circumference." —*Chronicle.*

VARIETIES OF THE NORWAY MAPLE.—Perhaps if the mass of persons wise in tree planting had to choose one tree as combining most beauty and hardihood they would select the Norway Maple. In fact this very selection has been made by a vote of just such authorities. That the Norway Maple in its natural form is excellent in every way desirable for a tree is unquestionable. But I wish to note that in no way do the varieties fall short of the excellence of their parent, but that, on the contrary, they even surpass in certain ways their worthy progenitor. The variations of most hardy plants assume one of two or three types. They are either variegated in colour, or cut-leaved, or weeping in form. Varieties of Norway Maple never weep, as far as I know, but they do divide and colour their leaves in very curious as well as delightful fashions. Their names are *Acer platanoides cucullatum*, *A. Lobergii*, *A. Schwedleerii.*

## ENGLAND.

The preparation of land for new plantations, whether effected by means of steam cultivation, by horse-power, or by trenching, should now be vigorously prosecuted in order that the soil may have time to become mellow before the planting season arrives. Upon heavy lands, where pitting is the only preparation, it is very necessary that this be done early. Upon land not too light to benefit by the operation, preparation for notching may be made by breaking up with a pick the sites intended for the young trees.

Wood rides should be mown and cleared and afterwards rolled down, pinnocks and water-courses attended to, hedges trimmed and repaired, and all work within the woods completed before harvest commences, so that game driven in may afterwards remain undisturbed. Pruning should also be finished as soon as possible, hedgerow timber being attended to as soon as the harvest operations will permit the work to be carried on without injury to the crops. The maple, birch, and wild cherry are better for late pruning.

Hollies should have been transplanted in July; but where this has been neglected, they may be removed with safety during favourable weather at the beginning of August. In many instances they have, with care, been transplanted of a large size throughout the months of August and September. The secret of success is keeping the roots well protected during removal, and if put into a rich loamy soil there is but little fear of failure. Other large evergreens may also be now transplanted, and if dry hot weather follows, watering and mulching will be necessary.

Land intended to be laid down to permanent pasture should now be well worked and thoroughly cleaned. If a coat of lime is spread upon it and well worked in, it will be an excellent preparation for laying down.

Browsed branches in parks should be trimmed off, and such as are drooping within the reach of cattle may be lightened or foreshortened to prevent future injury. In young plantations all rank growths of weeds should be cut off to prevent seeding, and young trees should be kept clear of rubbish and have sufficient head room. Spring planted trees may still require treading up and fixing in cases where they were planted out of considerable length.

Layering may commence from stools which have been prepared for the operation, and the layers should, if possible, be firmly fixed in a prepared soil. Superfluous shoots from coppice stools may also be removed, and by this means the remaining ones will be strengthened for future layering. Trees upon which either budding or grafting was done early will want attention, such as the removal of new shoots and the slackening of bandages, or the removal of the clay. Hollies, thorns, and chestnuts may still be budded.

In the nursery young trees may be pruned up preparatory to autumn removal, and composts should be made and others turned ready for use. Cuttings of holly, laurel, bay, yew, and privet, about nine inches in length, should be made and thrust into prepared beds, with one-third of their length above ground. Last year's cuttings of the same kinds may now be transplanted.

All iron-work and wood fencing which has so far been neglected should at once be painted or tarred while the weather is warm; and fencing posts for new work, as well as spurs for the old, should be well soaked in creosote for some time before using.

*Pluckley, Kent.* A. J. Burrows.

## SCOTLAND.

Owing to the rains during last month herbage has been growing rank. This will have to be kept down in all recently formed plantations, and especially where the trees are larch. While the days are long and the weather fine, the opportunity should be taken to get forward all outlying work, such as thinning young plantations, enclosing for future planting, draining, &c. Prune ornamental and park trees, also clean them of all dead wood. In the nursery the budding of trees should be commenced; also attend to keeping down the weeds, which spring up so quickly in such moist weather. W. W. R.

## WALES.

During the past month we have been visited by severe storms of thunder and lightning and heavy falls of rain, which have done considerable damage to roads and drives. With an abundance of rain, and moderately warm and growing weather, young trees as a rule are looking well, and in most cases have made good growth. Sunshine and heat is now wanted for the ripening of crops of all kinds.

Continue the erecting of iron and wire fencing, and paint or varnish the same during dry weather. Keep young hedges free from weeds or strong growing grass, and keep the soil loose about their roots by hoeing or digging. Towards the end of the month the switching of hedges may begin.

Plantation rides and shooting drives should now be mown and cleared up, and open drains or ditches that may have got grown over with herbage, or in any way chocked up, should be cleaned out.

Continue the preparation of ground intended to be planted during the coming season, by clearing, loosening, and draining where necessary. Where the ground is of a stiff or tenacious nature, deep ploughing, where practicable, is a capital preparation. Land so treated and thoroughly drained during the present month will be in good order for planting in the autumn.

Keep down weeds in the nursery, and clean roads and walks. Prepare material for repairing drives and walks in the autumn.

*Kinmel Park.* LEWIS BAYNE.

## IRELAND.

THE Board of Public Works in Ireland offer money on loan for estate improvement this year on very favourable terms, and it is to be hoped many landed proprietors will embrace the opportunity and add considerably to the acreage of plantation. In making this statement it is well to remark that the present special terms only hold good until the 31st December next, so that those who intend planting by money borrowed from Government must have it spent before the above date, otherwise the usual interest will be charged; therefore no time should be lost in preparing ground for planting by enclosing, draining, and clearing off scrub of furze and briars. Every preparation connected with, or which will facilitate the operation of planting ought to be attended to and forwarded as much as possible during the present month. Prune and clip live fences. Mow sides of open watercourses, hedges and wood drives. Trim rocket shooting coverts. Scour open drains in plantations, and repair the roads. Weeds are everywhere an annoyance at this season of the year, and ought to be cut or dug up wherever they are found growing. Clean carriage drives and walks, and keep the hoe going in the nursery and pleasure grounds. Plant cuttings in the nursery. Towards the end of the month evergreens may be moved and planted, choosing of course dull or damp weather, or water freely.

A thunder-storm of unusual severity visited this locality during the middle of last month, doing much damage to life and property.

Several large trees on the Cahir estate were shattered to atoms with the electric fluid. On Ballinacourte a large ash was struck and rent into fragments. All over the country, from reports to hand, the storm was more or less severe.

*Ballinacourte, Tipperary.* D. SYM. SCOTT.

## CANADIAN FORESTS.

THE following is the conclusion of a long article on Canadian forestry in the Montreal *Journal of Commerce*:—It is found that in no one section had any precaution been taken to create a continuous supply of timber—neither by replanting any portion of the land that has already been stripped of the timber, nor by protecting the young trees from the axe of the thoughtless or the improvident. That, though all the authorities deprecate the wanton destruction of the woods and forests, and deem as fatal to the best interests of the Dominion any delay in grappling with the question, yet no attempt has been made to correct the evils complained of.

It is now more than twenty years since the writer first brought to the notice of the Government the necessity for the protection of the fisheries, which were at that time given over to the destruction of all parties. He spared neither time, labour, nor money in collecting data to show the destruction that was being pursued in every part of the province. It was a Herculean task to combat the prejudices of the interested, but ultimately the necessary legislation was secured, and by the fostering care of the Government, by incessant vigilance day and night, and by a systematic organization (approved by the executive council), the proper protection of the fisheries was secured, these fisheries to become in a few years of that intrinsic value in which they are held at the present day. The woods and forests in this year of grace, 1879, are in the same condition that the fisheries were prior to 1859, and the same authority that led to the preservation of the one must be invoked to stay the evil that has fallen on the other.

The produce of the woods and forests is the chief staple of commerce. It has given untold wealth to the country and to the public treasury, and employment to tens of thousands of people in each section of the Dominion. It is an interest that has made the country what it is, and in it is involved her future welfare. Surely, then, it were wise to devote a portion of the "Crown and timber dues" to the replanting and protection of the forests, so much needed and so loudly called for.

No doubt can be felt as to the desire of the Government to act in this matter in the interests of the country at large, and each province should bear its relative proportion of expense that would be incurred in replanting and protection, while at the capital the necessary machinery should be invoked to establish a school of forestry, that has been so urgently and unanimously recommended by all authorities who have given this question their study and consideration.

[*Correspondents sending letters signed with initials or fictitious names are requested to enclose their name and address, as otherwise their communications cannot be inserted.*]

## SILVER FIR DAMAGED BY INSECTS.

Sir,—In October last I perceived a silver fir in bad health near my house, aged about thirty years, infested with wasps. On examination I found that the branches were covered with myriads of black bugs, of various sizes, many of which had wings. The wasps were attracted by drops similar to honey-dew, coming from the insects profusely.

I had all these insects destroyed at once, by carefully rubbing the tree. I found clusters on other silver firs near, and destroyed them also. The trees appeared to be free from the insects during the winter, but they reappeared last month in great quantities, not only on the trees affected last year, but on hundreds of others of the same age, and younger, nearly two miles away. Some of the trees most infected last year appear very delicate now, and have made little growth, though they were then in vigorous health; and some of them in the parts where these insects were most numerous appear to exude sap. I have tried syringing with paraffine and water, with little effect, as it only appears to kill the youngest insects, and it is extremely difficult to apply it so as to reach them, for they cluster on the under side of the branches. I am at a loss to know what to do, as I am convinced from the appearance of the trees most affected last year that should these pests be allowed to increase, they will very rapidly prove fatal to any tree they attack. I send a small box containing some of the insects, and trust that you or some of your correspondents, may be able to offer some information and advice.

*June 7th*, 1880. Yours truly, Ardilaun.

[We submitted the insects mentioned in Lord Ardilaun's letter to Miss Eleanor A. Ormerod, who kindly sent us the following reply:—"Sir,—In reply to your communication received this morning (with specimens accompanying) regarding insects attacking Lord Ardilaun's silver fir, I am able to say that they are pine aphides, but the specimens being dried and not giving all stages, I am not able to name the species.

"With regard to their habits, they are well sketched in Lord Ardilaun's short communication, dated June 7th, 1880. Aphides are for the most part produced alive, and resemble the fully developed insects, excepting that they have no wings—in maturity individuals of both sexes often (but not always) are winged. This agrees with the description of myriads of black insects, many of which have wings. The hard brown wingless specimens accompanying the blackish winged ones are miniature aphides killed by a parasite that has escaped through the puncture. The exudation of honeydew is observed, and the escape of sap from the tree is from the puncture of the rostrum, or long sucking-tube of the insects. This is fixed into the bark, and the perpetual withdrawal of sap, far beyond what is wanted for the supply of the insect, as shown by the quantity passing away, and attracting in this case the wasps, and commonly the ants, is excessively hurtful to the tree. The rapid multiplication of these insects make them a perfect scourge where they cannot be got under.

"If it is possible to do so, I should advise washing all twigs and branches in reach with soft soap, or common washing soap and lime water.

"If this is well laid on—that is, a good thick application well rubbed in with a brush where possible—and put strongly on the shoots and then brushed the way of the leaves, it gets off a quantity of the insects, and makes anything it is put on so thoroughly disgusting to the 'insect vermin' for a while by the scent, that it greatly discourages attack. I enclose some twigs of a pine which was exceedingly badly infested with an allied insect, and which was thus treated with soft soap about a fortnight ago, to show that the young foliage is not injured by the treatment. The bark of the tree is now quite clean, and very little insect presence shows amongst the leaves. The tree is about 15 ft. high.

"Where the shoots cannot be conveniently reached with the hand I should suggest making a strong solution of soft soap and applying it with the syringe. I have heard that a strong infusion of quassia is of great use, but have no experience of it myself.—ELEANOR A. ORMEROD, *Dunster Lodge, Isleworth, July* 21, 1880."]

## BLIGHT IN THE MOUNTAIN ASH.

SIR,—I hope some of your numerous readers may be able to explain the reason of the blight which has attacked the mountain ash or Rowan tree. The blight consists of a small green fly, similar to the fly which is found on the gooseberry bushes; the leaves at the end of the new shoots are chiefly attacked, curling up and eventually turning mouldy and black. The trees mostly affected are of four years' growth. Although I noticed it on the full-grown trees, many of the young trees which were growing vigorously and well three weeks ago are now all withered up and dead; even the branches of the trees seem to have shrivelled and died. I should like to know if it is a general blight, and if there is any cure for it.

J. E. S.

## PLANTING FOR SHELTER ON THE SEA COAST.

SIR,—Eight years ago I was asked to visit the west coast of Ireland and lay out a piece of ground for planting. At the part—the west of Clare—

I was operating on, the wind had a clear sweep inland from the Atlantic Ocean, and it is well known the Clare side of the Shannon, as far up as opposite Foynes, is particularly exposed to all the fury of an angry storm. When going about the locality I observed that all the farmers had screens composed of poplar, willow, alder, elder, &c., sheltering their cabins; these screens and any other scrub growing in the neighbourhood presented a rather unique appearance from the effect of the sea breeze. Still I could not ignore the hint—"Better a wee bush than nae beild,"—and in my operations took my cue from the natives. My instructions were to form at any reasonable cost coverts for game, particularly pheasants. This being the case, my first object was to secure a proper protection for the plants, and selected the best sheltered spot. I erected a ditch four and a-half feet high, six feet wide at bottom, and into the centre I stuck loppings of alder, willow and poplar. The loppings were in point of fact merely branches varying in length up to twelve feet, and some as thick as a man's thigh. Between the longer loppings were stuck privets, black sallow, snowberry, and elder to render the fence impervious to goats, &c. All the loppings took root and grew, forming permanent shelter. A hedge like this is far superior shelter to a stone wall. In proof of this one may satisfy himself by standing at a given distance from a high thorn edge and noting the force of the wind and then at a similar distance from a wall of same height; he will find that the force of the current is broken—dispersed—as it passes *through* the hedge, but concentrated as it passes *over* the wall. I need not detail how I filled up the exterior of my inclosure, as my object in writing is to concur with Mr. Hutchison's able paper on same subject in this year's number of "Scottish Arboricultural Society's Transactions." The work I have alluded to in the above remarks proved most successful, and I have no doubt much could be done in the way of planting our treeless coasts if only suitable spots were selected to begin with.

*Ballinacourte, Tipperary.* D. SYM SCOTT.

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## A CELEBRATED OLD PEAR TREE.

SIR,—Your suggestion to the Editor of the *Antiquary* in the February Journal (just received) has caused me to inform you of a very old pear tree on the estate of Kildalloig, near Campbeltown, Cantire, which has been known to have existed for many generations.

A former proprietor, Mr. Campbell, of Kildalloig, caused it to be built up a considerable distance or height inside with stone and lime to give support to the shell, while the limbs of the tree were supported by good forks got from the neighbouring plantation. The fruit is unknown to many good judges; I myself have asked a few, but none could say decidedly what it was, only that it resembled such and such a pear.

It is a fine pear, well known in the district around, and probably its antiquity adds to its celebrity. The old proprietor was himself a good botanist, and acquainted with the curator of the Dublin Botanical Garden, but could not give it a name.

The residence of Kildalloig is a very ancient one, and is only a short distance from the celebrated cave of St. Kearan, who was coeval with St. Patrick, and the district was at one time the Dalrudian kingdom. I have therefore come to the conclusion that the pear tree must have been planted by the monks of the olden time; that they were in the habit of doing so is known by the Arbroath pippin, or the Oslin apple. The situation of this old pear tree is good, and the climate on the whole genial.

I have known the hydrangea and myrtle flower there in winter when they would not in Edinburgh.

I have also to mention that there is an old tradition about this pear tree, that when it falls the property leaves the family of Kildalloig, which gives a great interest to this fine old tree, which in my time used to bear many bushels of fruit.

I may also add that part of the cross and font in St. Kearan's cave were to be seen in my early days, and that the font was there in 1842, and I have shot wood-pigeons in the cave; it was a favourite resort of the fishermen on the coast when baiting their lines.

The Kildalloig pear was known to my grand-uncle, whom I buried when a boy. He was eighty-four years old, and I am myself approaching eighty-two. In his time it was considered a very old tree; even this would give it a considerable age.

I am confident that the present Lady Campbell will graciously furnish any information which may be required.

Your obedient servant,

READER.

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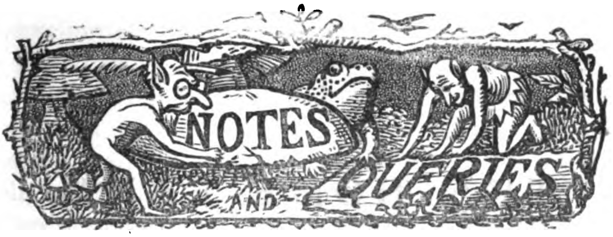
TURKEY OAK FOR COGS.—A tolerably long acquaintance with machinery of various kinds, and a distinct remembrance of some experiments made many years ago, have impressed me with the idea that this wood when matured and thoroughly seasoned might be found but little inferior to either hornbeam or crabtree for the above use. I am fully aware that wooden cogs are now much less used than formerly; but the loss of time occasioned by the necessary repair of a large driving wheel with cast iron cogs, which has to be drilled by a slow process to receive the new teeth, occasions a considerable loss of money. Only a few weeks ago I dropped in at some large works where from forty to fifty hands were thrown out of employment for the day by a simple accident of this kind. With a millwright at hand, and a supply of wooden cogs ready for insertion in a cast wheel the whole might have been set to work in half-an-hour. There is a considerable quantity of Turkey oak growing up in the country, and when at a sale of mixed timber a few trees of this kind are on offer, purchasers can seldom be found. Perhaps some of the numerous readers of the Journal may have had experience in the uses of this wood.—H. H.



## QUESTIONS.

59.—Ivy on Trees.—I have a large plantation of larch and hardwood trees about twenty-five years old, in which ivy has run up almost every tree to a height of from ten to twenty feet. It is often in thick masses and evidently affecting the progress of the trees. I intend stripping it off, but I am doubtful about the right season to do so. I am told that if I strip it now the trees will suffer during the ensuing winter. Is that so? and will some of your experienced readers help me out of the dilemma with their advice?—J. C., *Co. Carlow*.

60.—Worms Destroying Seedling Deodars.—I raised some thousands of Deodars last spring from seed sent home by a friend in Upper India, and having pricked them out in nursery rows in a bit of rich ground, I am much troubled at observing the greater part of them thrown out of the soil, or pulled into it by their tops by the common earth worm. I have sown soot and lime over the plants, but with little apparent effect in this showery weather. Can any of your readers suggest a better remedy for this vexatious nuisance?—Ignoramus.

[Try a dose of lime-water, and pick up the worms as they come to the surface. Repeat the watering and picking, and then cover the surface of the soil with a thin layer of sharp sand or ashes.—Ed.]

61.—Planting Moorland.—What system of planting would some of your practical correspondents recommend on wet moorland, exposed to the west, but sheltered with hills in all other directions? Also the size and kinds of trees they would recommend for the purpose? Any information on the subject will oblige.—An Owner of Waste Land.

62.—Caterpillars on Scots Fir.—What is the name of the caterpillars I enclose? They are in vast numbers on a young plantation of Scots fir. They are eating the leaves. I am afraid they will do great injury to the trees. Is there any remedy for them?—W. Johnston.

[Your trees are attacked by the caterpillar of the Pine Saw-fly, *Tenthredo pini*. Try sprinkling naphtha over them, as adopted by Mr. McGregor, Ladywell, Dunkeld, and described at page 821 of our April number.—Ed.]

63.—The Weymouth Pine.—Will some of your contributors be so good as to give their experience of the cultivation of the Weymouth Pine (*Pinus Strobus*) in this country? Is it a profitable tree to plant for supplying timber for home use? What soil, exposure, and altitude suits it best?—Planter.

Shrubs for Undergrowth.—What evergreen shrubs of a low-growing kind would you recommend for covering bare ground underneath large deciduous trees?—T. B. Walker, *Castleton*.

[Ivy, *Gaultheria Shallon*, Heath, Bilberry, and St. John's Wort (*Hypericum calycinum*) are all likely to do well for such a purpose in your locality.—Ed.]

# THE HOME FARM.

## OPERATIONS FOR AUGUST.

*Harvest Operations.*—These will include wheat, barley, oats, peas, rye, tares, winter and spring beans, flax and hemp, turnip and rapeseed, some of which have already been treated of in the work for July. By a concurrence of testimony obtained from the most practical agriculturists both at home and abroad, it has been fully established that the best time for cutting *Wheat* is about a fortnight before it is fully ripe, as the skin is then thinner, the grain fuller, the bushel heavier, and the yield of flour greater. These facts have been confirmed by numerous experiments. The theory seems to be that as the sugar of the green plant becomes in time changed into the starch of the grain, so in the fully ripened corn the starch is converted into woody fibre. Hence ripe wheat contains fifty per cent. more pollard and sharps than early cut grain, and in consequence of this much less flour. The largest proportions of starch and gluten are found in the grain fully a fortnight before complete ripeness. The straw also contains more soluble matter when it is cut early; it is therefore heavier and more nourishing.

*Oats* should not be allowed to get too ripe on account of their liability to shed in cutting, carting, and stacking. The straw of early cut oats is but little inferior for feeding purposes to ordinary fodder.

*Barley* should be fairly ripened, which is indicated by the red tinge passing from it and the ear turning down, while the straw becomes rigid near the head. Ripeness is particularly necessary in samples for malting, as this ensures a regularity of sprouting when wetted. Early cut barley generally assumes a bleached appearance. Small sheaves should be tied, and this is the more necessary where seeds have been sown with the barley. From the length of time such crops require to harvest, the colour of the barley is often injured by rain.

Wherever reaping machines are used the binders should keep close up to the cutting, and the horse-rake should not be far behind. In stacking corn the sheaves should be so laid as to slope regularly downwards and outwards, and then, even if the thatching be imperfect, no wet will touch the ears.

*Flax* may be pulled when about two-thirds the length of the straw has turned yellow and the leaf falls off. Early pulled flax is apt to be weak and light even though fine in appearance. Sort as it is pulled, keeping the strong standing crop and the weaker and laid portions separate.

*Hemp* should be pulled as soon as the stalks turn white and the leaves yellow. It should be bound in bundles not more than five or six inches in diameter and laid in ponds of standing water for four or five days, being afterwards spread out upon a bare pasture and kept turned.

*Grattans* as soon as cleared may be worked for stubble turnips, rape and mustard, or for trifolium and Italian rye grass. Where they are to be cleaned either by steam cultivation or horse labour, it is a good plan first to thoroughly pulverize the surface so as to facilitate the germination of the seeds of weeds, and afterwards stir deeply. A bed of cabbage for spring transplanting should always be sown not later than the first week in August. Allow one pound of seed for every three acres to be planted.

*Manures.*—These should now be carted from the yards and clamped near where they will be required during the autumn and winter. A portion should be set aside for top-dressing young seeds after harvest. Sprinkle gypsum with the heaps and lay a bottom of earth, peat or whatever refuse is available. A covering of chalk, to be afterwards worked into the bury, is found very useful. Green manures, such as buckwheat, rye, mustard, and tares, may be ploughed in as a preparation for a wheat crop. But with corn at so low a price and meat selling so well it is now customary to feed off these. Yet owing to their mechanical action upon the land and their enriching properties they are highly valuable upon poor clays. Twenty pounds of white mustard sown at the end of August may be ploughed in for the wheat crop early in November.

*Turnips* should now be broadcasted in districts where hop-picking, fruit-gathering, and other special operations are likely to interfere with the hoeing and singling of late drilled crops. These may be cleaned and thinned by the harrows or drags. The roots generally will still require both horse and hand-hoeing.

*Hops.*—Continue to shim or nidget in the alleys, taking great care not to go deep enough to cut off the fibres which now occupy the whole space. Use the sulphurator where mould is running. Finish hilling up, placing sufficient soil upon the crowns to protect them from winter frosts and the damage from horses and wheels during carting. Where stubsets are wanted, give an extra covering to ensure strong growth. Upon heavy clay lands it may now be advisable to run the double mould-board plough down the centre of the alleys and afterwards slightly round up the ridge. This will permit of ploughing back and slip-digging during dry weather either in winter or the early spring. Lay in coal and coke for drying and burn charcoal, also get brimstone for bleaching, and make hop pockets and have everything in readiness for the picking.

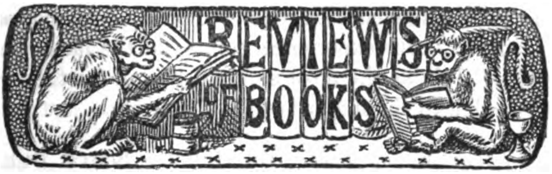
*Live Stock.*—Horses will be fully occupied in carting grain, working grattans, and horse-hoeing turnips, and should have a liberal allowance of green food with a little corn. Feeding cattle should have a good and shady pasture, with a daily allowance of cake. If in lodges, comfrey, tares, lucerne, and the second cut of clover will be available, and early cabbage may be ready by the end of the month. Turn off dairy cows which are heavy in calf, and draft off cattle, sheep and pigs for feeding. Store pigs may go out stubbling daily. Sell out surplus lambs, and draft off spare rams, barrens, &c. Guard against fly, and dip for both tick and scab. Put rams to ewes for house lambs in January. As a preparation for autumn folding cart out upon the pastures a few early white turnips.

*Poultry.*—Geese and turkeys may be turned upon the stubbles, and ducks should be well fed and put upon the market.

*Meadows* should now be top-dressed where required and afterwards heavily dragged. All thistles should be spudded, and nettles and rushes mown close. Preparation may also be made for the irrigation of water meadows.

*Estate Work* should demand but little of the horse labour of the farm until the completion of the harvest; but all implements, such as brakes, shims, tedding machines, rollers, &c., should be cleaned up and repainted before being put away for the winter. B.

THE WAX TREE.—The most important article for illuminating purposes in Japan is the candle made from the fruit of the wax tree, a tree about the size and appearance of the common sumac of this country. It is grown more or less extensively almost everywhere in Japan, and especially in the western provinces, from the south northwest to the 35th degree. The tree has a quick growth, and attains the dimension of a foot and a half, and a height of 25 feet. The blossoms appear in June. They begin to yield berries the third or fourth year. The berries are the size of a small pea, of a white colour, hanging in clusters, and contain the wax as a thick, white coating of the seed. The full-grown tree is said to yield about 50 pounds of seeds annually, nearly one-half of which is wax. It is a hardy plant, growing on indifferent soil, and living for many years. In Japan they are planted by the roadside, on embankments, and in out-of-the-way places. The wax is obtained by the berries being crushed, steamed, and then placed in hemp bags and pressed in a wedge-press. It is also obtained by boiling the bruised seeds and skimming the wax from the top. The wax is a palmatine or glycerine; when first extracted it is of a yellowish white colour, and somewhat softer than beeswax. It melts at 127 degrees, and when formed into candles gives a fine, clear light. In ordinary candle making the unbleached wax is used. When washed and bleached in the sun and air it assumes a pure white colour.



*The Tree Planter*, and *The Tree Pruner* By SAMUEL WOOD. London:
Crosby Lockwood & Co.

THE increased attention which has of late years been bestowed upon the planting and cultivation of timber has called into existence numerous works calculated in a greater or less degree to meet the wants of foresters and landowners. But it is frequently found that the contents of such books do not accord with their titles, so that purchasers are considerably disappointed.

Whoever takes up the two small volumes now lying before us, under the impression that he will find in them elaborate directions for the planting, or propagating, and pruning of timber or forest trees, is doomed to disappointment; for while the first volume disposes of these in a few pages, and ferns occupy about four times the space devoted to chestnuts—the latter being dismissed in two short paragraphs—in the second volume the pruning and renovation of park and avenue trees occupy about three pages out of one hundred and fifty.

As guides to the amateur gardener the books are valuable, and a large store of information upon the planting and propagation of ornamental shrubs, climbing plants, greenhouse and herbaceous plants, fruits and herbs are here placed before him in a condensed form. Viewed in this light, the work is a genuine *multum in parvo*, and a whole library of works on gardening must be consulted to obtain what is here compressed into about three hundred pages. The illustrations are excellent, and by their aid and a moderate acquaintance with vegetable physiology, combined with a fair amount of manual dexterity, the beginner can hardly fail to achieve a considerable amount of success in his work.

The range of the books is great, and like the wise man of old, the author discourses of plants from the cedar of the mountains to the hyssop springing out of the wall. He is evidently a man of large experience in propagating, grafting, and budding; and he writes with the confidence of one who has thoroughly mastered the subjects upon which he treats. The knowledge of timber trees displayed in the work is, however, of a more limited kind, as is evinced in the remarks upon the beech on page 11, and those upon the oak at the foot of page 3. The beech is well known to grow freely and attain a large size upon chalky as well as sandy soils; and we know of many magnificent specimens of this tree springing from the slopes of chalk hills and from Kentish rag. Quick-grown oak, also, instead of being in all cases the "porous and brittle" material which is here described, is preferable to that of slow growth for uses in situations where there is great lateral strain or considerable wear on account of its strength or fibre.

From the directions given with regard to pruning young oaks in spring, we dissent entirely. Our experience points out the latter part of June or the beginning of July as the most suitable season for this work, and this remark is applicable to the majority of timber trees.

*Outlines of Farm Management.* By ROBERT SCOTT BURN. London: Crosby Lockwood & Co.

THE present volume completes a series of handy treatises, by the same author, on the various branches of modern farming, each giving in a plain and useful form a capital "outline" of the department treated upon. While the preceding volumes of the series have been devoted to details of the work of the farm in its various departments, they do not take up the agents, either personal or mechanical, by which that work is done, nor do they concern themselves with the various details effecting the economy and value of the work. The volume before us, however, treats upon all the points connected with the farmer and the labourer, considers how they can and do affect the character of the work done on the farm, and how their efficiency is promoted or otherwise by the force of circumstances, combined with the possession or the want of education. In carrying out his object, the author discusses in short and pithy sentences the relationship between the farmer and his farm and how he influences its success or otherwise, the position in which he stands to those whom he employs, and to the various agencies he makes use of. The various points connected with the labourer and his position on the farm, the work he has to do, and the relation in which he stands to his employer, are all ably and concisely discussed.

Then follow chapters devoted to the details of the labour of the farm, including the various classes of work done in the fields, such as draining, digging, fencing, as well as the general routine of the cultivation and harvesting of the crops, and the work connected with the management of live stock generally; upon all which points much valuable information is given, which will be found exceedingly useful to the beginner. The economy of the farmhouse is closely connected with the prosperity of the farm, and the subject, in all its bearings, is ably handled; the important elements connected with domestic service receiving full attention,—including the engagement of servants, their wages, and general management. Following upon these, the subject of provisions, their purchase and storing away, is fully discussed; while many excellent practical hints are thrown out as to their judicious distribution and economical management.

The cottage of the labourer, and the duties which he owes to himself, as well as to his employer, form the subject of a very interesting chapter, in which the various points are ably expounded, and may be studied with mutual advantage by both employer and employed. Excellent advice is given to the cottager on the economical management of his home in all its departments, and the many ways in which he may add to his income by the raising of a variety of garden produce, for which he can find a ready sale, and the keeping of poultry, pigs, bees, and such like. To aid him in the management of these latter, concise but extremely useful chapters are given, setting forth the best way to make the most of the garden produce, of the management of the pig, poultry, pigeons, rabbits, and other birds and animals, while a special section is devoted to the subject of bees, which is a most important one to the industrious cottager. A host of other matters of deep interest to the farmer and labourer are all treated of in an easy and popular style, and the book is freely illustrated with diagrams and woodcuts explanatory of the text, and accompanied by a capital index, which makes it a really useful addition to the literature of the farm. The book is cheap at half-a-crown, and ought to be in the possession of every farmer and labourer.

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The July Part of the *Florist and Pomologist* contains two very handsome chromographs, *Anthurium Andræanum*, and a beautiful group of new yellow picotees, Lady Rosebery, Princess Beatrice, and Ne Plus Ultra. The magazine contains the usual quantum of useful reading and amongst other matter we notice an article by Mr. T. Moore, recommending the extended use of cocoa-nut fibre refuse.

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One of the things in which our American cousins excel us, and to which they certainly devote more attention is the dissemination of useful agricultural information, such as weather reports, the state of the crops, &c. ; this is part of the work of the Department of Agriculture, and we have no doubt that whenever our own Government thinks fit to create a Minister of Agriculture, he will find lots of really useful work to turn his hand to. We have lately received from the States a copy of a pamphlet "Illinois Crop Prospects," wherein we find a complete tabulated report of the state of each crop in each of the twenty counties of the State. From this we gather that the season of 1880 has been exceptionably favourable for ploughing, planting, and the cultivation of crops, as well as the most satisfactory results attending the breeding and feeding of live stock.

"The exceptions in the way of drought, excessive rains, injury from insects or diseases among farm animals, are unusually rare and confined to narrow limits, and the loss therefrom will be comparatively small in the localities where reported.

"The crops are in promising condition with scarcely an exception, and seasonable weather until the hay and grain crops are harvested will ensure crops much above the average both in quality and quantity."

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We have received Messrs. Osborn and Sons' catalogue of stove and greenhouse plants, ferns, &c., which includes some novelties. Messrs. Little and Ballantyne, of Carlisle, have also sent us a copy of their "Treatise on Natural Grasses," which contains some useful hints on laying down pastures, with a table of grasses, &c., with English names, and quantities to be sown per acre.

## OUR FOREIGN EXCHANGES.

There have been received from Bohemia *Haj*, No. 6; *Lovena*, No. 6; and *Domacnost*, No. 6; from Austria, *Handelsblatt für Walderzeugnisse*, Nos. 24, 25; *Oesterreichische Gartenlaube*, Nos. 19, 20; from Germany, *Deutsche Tischler-Zeitung*, Nos. 12, 13; from Holland, *Handleiding tot de Beelt van Jess-ooft voy naar 't Hoogduitsche van* E. J. Peters, *dow* K. J. W. Ottoländer *Bovinkweekes te Boskoop*; from France, *Revue des Eaux et Forêts*; and from Spain, *Revista de Montes*, Nos. 82.

In the *Revista* are given a continuation of a translation from the Italian of *Elements of Forest Taxation*, by Don R. Alvarez Sereix, the conclusion of a paper on "Vegetable Fuel," by Don Carlos Castel; and a paper by Don A. Seriex on the "Schools of Forestry" in Munden, Tharand, Hohenheim, Tubingen, Carlsruhe, Giessen, Brunswick, Eisenach, and Vienna.

In the *Tischler-Zeitung* a full account is given of a cabinet makers' School of Instruction organized in Furfwangau, in which instruction is given in very branch of learning in regard to wood, its production, and its fabrication. In the *Handelsblatt* there is an account of the exhibition of wood-carving and turnery of Germany, Austria, and Hungary, opened in Leipsic, in June last.

John C. Brown.

## A PROPOSED AMERICAN SCHOOL OF FORESTRY.

A Bill for the establishment and maintenance of a school of forestry at St. Paul, Minn., has been introduced in the Senate by Senator McMillan. It would seem to be time that some attention was paid in this country to the conservation of our forests, and this proposed school seems to be a step in that direction. As a means of supporting the proposed school, the Government is called upon to grant 300 sections of the public lands of the State, to be selected by an agent appointed by the Governor, with the approval of the Secretary of the Interior. Not more than two sections are to be taken from any one township, and those selected are not to be mineral lands. The sections are then to be sold, and the proceeds invested in United States or other safe bonds, at not less than 4 per cent. interest. The capital is never to be diminished, and the interest is to be appropriated for the endowment and support of the school, which shall give instruction in the science and practice of forestry, as adapted to the climate and soil of the State. Ten per cent. of the interest may be set apart for the purchase of lands for experimental out-stations for tree culture on prairie lands and forest culture on lands, when such experiments shall be authorized by the legislature. No part of the fund or interest to be used in buying, erecting, or repairing the school building, and unless the school is provided with a suitable building and forty acres of land for experimental timber culture, within eight years, the grant is to cease. The State must employ at the head of the school a person of known qualifications in the science and practice of forestry, and the tuition is to be free. Pupils are to be admitted from any State. An annual report of the progress of the school and the results of its experiments is to be filed with the Librarian of Congress and the Commissioner of the General Land Office.

# TREES BEST ADAPTED FOR PLANTING AS SHELTER IN THE ISLANDS OF SCOTLAND.

By ROBERT HUTCHISON, F.R.S.E., of Carlowrie.

(*Reprinted from "Transactions of Scottish Arboricultural Society.*")

There can be no doubt that, at an early period in the history of Scotland many districts and large tracts of land now denuded of timber were thickly covered with indigenous wood. That many of the islands also were similarly clothed there is ample testimony to prove, in the remains of tree stumps found submerged in lochs and at low water-mark along the coast lines, while in some instances, such as on Loch Lomond, and Lake of Menteath, and others, we still find large old trees of indigenous growth, many of them in pristine vigour, and remarkable for their gigantic proportions. In such inland situations, of course, more favourable circumstances exist for their growth than are found along the sea-board, and on more exposed islands, but still there are ample traces of the wooded condition of many of these parts also in former times. We are therefore naturally led to ask the questions, what are the causes which have led to their present treeless state? and is it not possible again to replant many districts in them? In regard to the former of these inquiries, and independently of any artificial cause—such as destruction and pillage, from which so many of the Western and other islands on our coasts suffered at the hands of the fierce contending clans, and from invasions of marauders in the Middle Ages, and even down to comparatively recent centuries—there are physical causes at work in such situations, rendering the culture of timber more difficult, and far greater attention to its management requisite, than could be given to it by such communities as appear to have peopled the islands. Thus, from neglect probably, and from the fact of the timber having existed in smaller masses, and enjoying consequently less shelter from one another, the trees would be more easily overturned or destroyed by the severity of gales and storms which swept, and still continue to sweep, periodically around the Scottish shores. Having thus fallen into a condition of *tree-barrenness*, and the soil in the highlands having also suffered deterioration from the loss of the annual leaf-fall and vegetable mould, from which, during their wooded era, it must have benefited so materially, it is now matter of considerable difficulty to restore these islands to any degree of capability for being successfully planted anew; but with skill and cautious perseverance in using the proper materials in suitable sites, much might be done to replant their areas with indigenous timber trees, and so ameliorate their many climatic extremes.

The first important point to be observed in planting within the influence of sea-margins is to select suitable spots on which to proceed with the initiatory plantations, to act as shelter for others to be afterwards established, when these trial or pioneer sheltering belts have fairly made good their footing. It will be found that localities in the immediate vicinity of the sea vary most materially in soil and subsoil, and it is of the utmost consequence that trees of a description most adapted to each sort of soil be selected. Due regard must also be had to the exposure of the site, and to shelter from prevailing winds being in the first plantations well secured. Preparation of the soil of the site may also be in a great measure requisite. Trenching the ground will in many cases be found of the utmost service, in enabling young plantation strips to establish themselves where previous attempts had failed; and screens of any sort of brushwood or plantation thinnings may with advantage be used as hedges in sandy soils on very exposed sea-side situations, to prevent the sand-drifts caused by prevailing winds, from completely smothering the young trees first introduced. The appropriate selection of the most suitable varieties of trees to be introduced is the next important point to be decided on. Great fallacy has hitherto prevailed in regard to the selection of trees for sea-side and island planting, and hence much of the failure has arisen. For particular situations some varieties of trees are much better adapted than others, and this is especially noticeable in regard to indigenous trees; and in planting in island and sea-coast situations in such a climate as that of Scotland, none but indigenous varieties in the first instance should be adopted. Neglect of this axiom has been a fruitful source of failure in many places, and much may be done in commencing with mere shrubby plants and low bushes, to secure shelter for the two-year old seedlings and young hardwoods to be afterwards planted among them. Were it not that in many sandy soils near the sea-shore rabbits abound, it would be better to *sow the seeds* of trees intended for growth as shelter or value, rather than plant young trees from nurseries, probably far inland, and where they have, at any rate, been reared under very different circumstances from what they are, in their new situation, to experience. In planting, it is most essential to expose the roots of the trees to the brine-charged air of the sea-coast for as short a time as possible, for it shrivels and dries up the young spongeoles, and is frequently a source of non-success, and of many deaths and blanks in island and sea-shore planting.

Next to the due preparation of the ground by trenching, and, where necessary, draining it, a screen in every exposed situations, either where there is much sand-drift or sea spray, is of the utmost importance to ensure ultimate success. The most difficult coasts to deal with in planting are those composed of level sand-hills, and sharply sloping banks facing wide and open sea-boards. In these, the mere planting of young trees without any previous attempt to shelter them from the heavy sweep of wind from the sea is futile labour; but by rearing a simple screen of brushwood, composed perhaps of cut branches of spruce-fir, which is very useful, or of any other description of tree loppings, an immense advantage is gained, and a favourable start is ensured for the young trees. These screens or "break-winds" may be raised to resemble hedges, by having the spruce or other branches fixed like garden pea-stakes to two lengths of paling rail, securely fastened to stobs of 6 feet in length above ground. The stobs may be 12 feet apart, and in this way a sort of *dead* hedge, but possessing all the advantages for shelter of a living one, is secured. Such a mode of shelter is infinitely superior to a dry-stone dyke or turf wall, over which the prevailing wind bounds with redoubled violence, and leaves the young trees cut across, as it were with a pruning knife, about the level of the top of the wall. Inside this artificial hedge, where it is required (and it is only assumed that in situations *peculiarly exposed* to open wide seas will it be requisite to erect such a screen), should be planted nearest to the sea-margin of the proposed plantation in any instance—a belting of sea-buckthorn (*Hippophae rhamnoides*), and elder (*Sambucus nigra*), in equal parts, to a width of from 20 to 25 feet. Interspersed amongst these, and generally throughout the whole extent of the plantation, may be planted very extensively, the *Lavatera arborea* or tree-mallow, so well described for its varied utility by its discoverer, Mr. Gorrie, in vol. ix. of the fourth series of the Highland and Agricultural Society's *Transactions*, p. 286. Having thus formed the outline of a proposed plantation in an island situation, the next point we have to deal with is the description of hardwood and other trees, with which to fill up the same for future and ultimate profit, or shelter, or ornament. The consideration of this point naturally leads us to notice the most suitable trees of the two great families—conifers and hardwood.

Generally speaking, hard-wooded trees are more adapted for situations such as we are treating of than the resinous or coniferous species, though some varieties of the latter succeed well also. These are, however, fewer in number than are to be found amongst the deciduous descriptions.

Amongst the coniferæ found suitable for withstanding sea-breezes and exposures on coasts are the following: *Pinus montana*, *P. pumilo*, *P. pinaster* or *maritima*, *P. Austriaca*, *P. sylvestris*, and *P. larico*; and in good sheltered soils the silver fir, *P. pectinata*, has sometimes succeeded very well. Of the hard-wooded sorts, undoubtedly the best to withstand wind, in any situation is the plane-tree or sycamore (*Acer pseudo-platanus*). Its branches being "twiggy," it resists the gales with greater impunity than any other, and forms a fine round head under any disadvantage of exposure. Several of the poplars also do well, notably the *Populus tremula*; several of the alders in wet situations or soils, as *Alnus glutinosa*; and the hoary alder (*Alnus incana*), Norway maple (*Acer platanoides*), and many of the numerous members of the willow (*Salix*) family. In sandy soils, or, indeed, in pure sand, the goat willow (*Salix caprea*) is an excellent variety to plant; also the Huntingdon willow (*Salix alba*), and the mountain ash (*Pyrus aucuparia*). Birch, ash, elm, may next in order be named, and lastly, oak and beech. Indeed, the last mentioned is least suited for planting in such situations, or near the of influence the sea-breezes. It may be almost pronounced a complete failure.

Many of the smaller shrubs, and such plants as are commonly used for under-cover in inland plantations, are also well adapted for use in island and coast planting, to serve as nurses for the larger trees when first planted. Such shrubs and bushes as the common Scotch rose, hawthorn, holly, snowberry, laurustinus, ribes, lilac, syringa, bird cherry, and *Spiræa adiantifolia*, may be introduced with advantage; and in situations of a sandy soil and less exposure to wind, the *Mahonia* and common *Arbor vitæ*. We should not, however, omit to notice the evergreen oak (*Quercus ilex*), which is an admirable tree to plant on island and coast situations, and one which is far too little used in this country. Of course, the well-known hardihood of the common elder (*Sambucus nigra*), and to which we have already referred, as also the tree-mallow (*Lavatera arborea*), also noticed, precludes the necessity of repeating their merits here. They are undoubtedly the pioneers to be first put forward in all situations of difficulty. Of trees unsuited for planting in such sites as we have been noticing, the spruce and larch are chiefly to be avoided. The latter may, in the shelter of other trees, do fairly well in suitable soil, but the former is too shallow-rooted to be able to withstand the wind, while its foliage and young wood is easily browned and stunted by the action of the salt spray with which the atmosphere in such situations is generally charged.

In advocating the rehabilitation of many of our islands and barren seaboard coasts, as we have done in the foregoing paper, it may be asked by the incredulous (and they are very many), in regard to sea-side planting, Where are the proofs of success of the arguments adduced? This is quite a natural and proper question, and we are not afraid to face it. Want of time alone—owing to the curtailed limits necessary to comply with the rules of the Society, within which this paper can be given—prevents us citing full details of recent successful seaside planting in several of the islands that surround the Scottish coast.

We need only refer to the extensive, important, and successful operations of Sir James Mathieson, of the Lewes, in the island of Skye; of Mr. John Munro M'Kenzie, of Morinish, in Mull, and several other proprietors of large area in that island; as also of the endeavours of Colonel Burroughs in the Shetland and Orkney Islands, to show that there are proprietors who *do* believe in the possibility of re-establishing timber in the most unlikely situations in the outlying islands of Scotland, and who are encouraged by the success they have already attained, in going forward in the van of progress, with judicious planting, under careful arrangements as regards their respective localities and circumstances. Doubtless, these experiences have been earned at considerable expense and personal trouble, but they will, in the long run, while benefiting the philanthropic proprietors themselves pecuniarily in the first instance, and to which they are most justly entitled, lead others also to follow in their steps, and convert what at present are arid, barren, sandy wastes into useful and remunerative acreage.

# THE FUTURE OF EPPING FOREST.

NOTHING of late years has contributed so much to the popularity of that often-threatened—and, we may therefore assume, long-lived—body, the Corporation of London, as their action with regard to the preservation for the public of Epping Forest. Last remnant of an immense tract of woodland noted as a favourite hunting ground of the early Norman sovereigns, Epping Forest would in a few years' time have been eaten up by the inclosures made by neighbouring landowners and lords of manors, had not the civic authorities taken up the cause of commoners, and with them the cause of the public at large, interested not in the comparatively trifling rights of turbary and pasturage and estovers, but in the maintenance in the immediate neighbourhood of the metropolis of open spaces preserved in all their natural wildness, to which every one can have free access for purposes of recreation. We believe it has been estimated that on a bank holiday as many as fifty thousand persons, chiefly, of course, from the East-end of London, have traversed the glades of Epping Forest. The importance, therefore, of preserving, improving, and making the best of a region embracing some six thousand acres in extent, and stretching more than twelve miles in a longitudinal direction, will be readily admitted.

A short time ago an able paper was read at the rooms of the Society of Arts upon "The Future of Epping Forest," by Mr. William Paul, a gentleman of great experience in horticulture, who moreover has had a nursery at Loughton, in the forest itself, for, as he tells us, the last sixteen years. He has also a close acquaintance with the locality, having, as he said, "in early life traversed its open spaces on foot, 'from morn till dewy eve,' and searched its glades and thickets for the numerous and varied botanical treasures which they contain." It will be seen, therefore, that Mr. Paul was qualified to deal with the subject he selected for his paper. Epping Forest having now been consigned to the Corporation of the City of London for the recreation and enjoyment of the public, we are all concerned, in a greater or less degree, in the manner in which the conservators in whose hands its management has been placed discharge their trust. The chief object to be aimed at would seem to be to maintain the wild character of the district as a whole, while adding to the attractions of certain parts by the hand of art. As Mr. Paul puts it, "Epping Forest must remain a forest; it must not be converted into a garden, an arboretum, or a series of arboretums; a park, or a series of parks; in imitation of the many beautiful but comparatively restricted surroundings of the residences of our English nobility and country gentlemen." Some time ago Mr. Wallace, in a paper which we believe was also read before the Society of Arts, advocated the introduction into the forest of a great variety of foreign trees. This view Mr. Paul, and most of the speakers who took part in the discussion which followed the reading of the paper, dissented from, as likely to turn the district, or a considerable part of it, into a museum of specimens, whereby the effect of real wildness would be lost. Mr. Paul suggested the planting of various kinds of trees not now found in the forest—trees remarkable for the beauty of their foliage in spring and autumn, or evergreens intended for shelter and effect in winter; but this planting was to be done only in the spots specially suited for it, and was by no means intended to interfere with and spoil the effect of the natural beauties which the forest presents as it exists. It seems, from the short list of trees and shrubs which in his judgment are most likely to contribute to the improvement of the existing landscape, that he includes only those which are known to be perfectly hardy in the climate of this country. Acting upon Sir Joshua Reynolds's principle—that where effects on a large scale are possible, "uniformity of colour and a long continuance of lines" are better calculated to produce grandeur than the mere variety of tints and forms occasioned by the indiscriminate introduction of a number of new specimens—he proposes the planting of groves of distinct varieties of trees, and of avenues in those parts through which it is intended to mark out roads and rides. Of course, it would be desirable to preserve to a great extent the open glades and stretches of pasture now existing in the forest, and any proposed planting would not, as a rule, interfere with or encroach upon them. On the other hand, the natural woodland should remain untouched, pruning and clearing being only admissible where it may be desirable to open out the scenery, or to thin out those parts already too thickly planted.

Water is allowed to be one of the most picturesque additions to a landscape, especially a wooded landscape, and water is absent from Epping Forest, although there are to be found within its borders remains of embankments which at one time must have stopped back large sheets of water which, as land became more valuable, were allowed to run off. The lower part of the forest would appear to lend itself readily to the formation of artificial lakes; but we should deprecate the introduction of "cascades, fountains, and waterfalls," as likely to detract from the natural aspect of the scenery, and give it the air of some suburban pleasure ground. That parts of the forest now inaccessible to any but the pedestrian should be opened out, by the formation of rides and drives, is obviously desirable, though this improvement is one that should be effected with a judicious hand; and if, as was stated by one of the speakers in the discussion upon Mr. Paul's paper, the conservators have already commenced to mark out broad straight roads through the forest, the sooner a stop is put to their proceedings on this head the better. In a tract of land which, from north to south, is some twelve miles in extent, good roads are of course essential; but to cut up the forest into a series of blocks, so to speak, by means of roads running at right angles to each other, would be to deprive it of the grandeur which is chiefly due to the entire absence of formality. Mr. Paul's suggestion that the ornamental character of the scenery might be increased by the introduction of flowering shrubs and creepers, by sowing the seeds of wild flowers, and by planting Pampas grass and other exotics, would be hardly practicable on a large scale, and if carried out partially would turn the forest into a system of parks or landscape gardens, and so destroy its character of natural wildness. It is proposed, we understand, and forms part of the scheme for the preservation of the forest, to inclose certain areas for the purpose of special recreation grounds, where cricket and other sports may be carried on. These spaces, being altogether artificial, might very properly have attached to them plantations of an ornamental character quite distinct from the natural forest, and the experiment of landscape gardening might be tried, with possibly good effect. But, as regards the general features of the district, we agree with the idea of Mr. Wallace that "it should be the first principle to cover the whole ground with forest scenery. Of course (he added) they would not interfere with the beautiful open grassy glades, which were the chief charm of forest scenery, because without them you could not see the forest." We have no doubt that the conservators are actuated by the best intentions in all that they propose to do for the improvement of the forest; but, though we may be assured of this, we may also feel that the open discussion of the subject, and the hints and suggestions from many quarters which may be thrown out in the course of it, cannot fail to be a great assistance to them in the discharge of their duties. Epping Forest is now public property, and the public have, therefore, a right to make their voice heard upon the question of how that property may be best preserved, improved, and developed.—*Field.*

## PLANTING CONIFERS IN WOODS.

The following remarks are made on this subject by Mr. Edward Luckhurst in a recent issue of the *Journal of Horticulture*:—

"No doubt the planting of conifers has often been carried out without due consideration; anywhere and everywhere have they been introduced with little regard to their appropriateness for certain positions. Let us not, however, rush to another extreme and exclude them altogether even from woods. Such sweeping measures seldom prove satisfactory. Rather let us adopt the happy mean of selection, taking care only to plant those which we have proved to possess characteristics suitable for certain positions, and that harmonize with certain surroundings. Retinosporas, Thujas, many Junipers, Cryptomerias, Cupressuses, and certain species of other genera of trim growth and formal aspect are undoubtedly best retained in dressing grounds; but among the species of Abies and Pinus we have noble timber trees worthy of a home in any forest, some undoubtedly of formal but not unstately aspect, others as wildly picturesque as anything indigenous to the soil of this country.

"I do not assert that conifers should be introduced into every wild woodland, for there are features which they would mar rather than embellish. Take for example a grove of fine old beeches, stately, majestic, symmetrical, and elegant, the huge stems rising like massive columns. Here conifers would undoubtedly be quite out of character, as in point of fact would any other tree. A fine beech requires no foil, it is always beautiful. Another example that may be usefully cited occurs in the beautiful grounds of Pentillie Castle in Cornwall. From one side of the castle terrace a lawn slopes downwards to a stream, forming one side of a valley, the other side being a dense wild wood. There are numerous fine specimens of *Pinus insignis* and other conifers on the lawn, but the wooded slope beyond has no conifers except a clump of Scotch firs planted in the background at its highest point with the happiest effect. A boundary belt of Scotch firs, or firs dotted among the deciduous growth, would have spoilt all; but the solitary clump was an artistic touch, imparting relief and beauty at a point so distant from the lawn conifers as to be regarded separately, and valued for what it was—just a picturesque clump of perennial greenery, and not a collection of fine specimens.

I live in a wood where beeches, birch, holly, and mountain ash abound; there are whole acres of heather, and the bracken in some parts grows higher than my head. The surface is undulating and broken with hills, valleys, dells, and numerous fern-fringed streams. In a wood so rich with natural advantages, only a few places can be suitable for conifers; yet we must not forget the woods of a flat country, often utterly monotonous and tame. Lately I was driving through a wood of this kind. On each hand the drive was shut in by a copse of hazel underwood thickly interspersed with oak, having that stunted appearance which is so certain an indication of a poor, thin soil. The wood was a large one, and so far did this copse stretch that the way seemed interminable. At length a curve in the drive led into a grove of old Scotch firs, none of them of extraordinary size, but individually picturesque, and the effect was enhanced by the depths of shadow up the long arcades, chequered by occasional gleams of brightness where the sunshine found entrance among openings in the foliage. There was nothing trim or formal there; it was a piece of wild woodland in the true sense of the term, the one redeeming feature, all the more appreciated from the aspect of utter sameness pervading the other parts.

"One other such wood do I know, but it is never offensive, for the simple reason that what little is visible acts as a foil to an avenue of magnificent old Scotch firs through which the drive runs. This latter drive is probably some thirty feet wide; the firs stand well back from it, and are far enough apart to do full justice to their noble proportions. In it I found the realization of an ideal avenue, the formation of which through such woods I had long before advised. I am aware that it is an open question whether the sides of such a drive might not be rendered equally ornamental with other trees, but can there possibly be any good reason for not planting such an avenue?"

## THE OLD TREES IN KENSINGTON GARDENS.

It will have been observed that the unhealthy condition of the trees in Kensington Gardens has lately been attracting the attention of the responsible authorities, and the Chief Commissioner of Works has been advised to subject the trees to a course of careful pruning and thinning. This is, no doubt, very good and safe advice, but it is greatly to be feared that the disease is too deeply seated to yield to so gentle a remedy. Any one visiting the locality will find a large area on the south-eastern side of the Broad Walk where the trees have been operated upon during the spring of the present year with what may be called a top-dressing, consisting of a mixture of strong loam or clay. It would seem as if one purpose of this top-dressing had been to fill up and level the inequalities of the uneven ground, and so render the surface smooth and orderly. Residing, as I have been lately, in the immediate neighbourhood of the Gardens, I have watched with interest and some surprise the progress of this novel work; the effort to reduce the inequalities of the ground, and so to secure a fairly smooth and even surface, has naturally led to the unhappy result of covering the roots of the trees to, in some cases, the depth of 2 ft. It is quite true that on very dry and steep banks there are certain kinds of trees capable of surviving treatment such as this, but instances of the kind are very exceptional, and no trees, young or old, will long survive having their roots placed unduly deep in the ground—in other words, buried. In the same locality, and immediately joining that referred to above, will be found a portion of the ground where, on previous occasions to the spring of this year, the trees have been subjected to this process of top-dressing; the effects of this earlier operation have, in not a few cases, already resulted in the production of leafless trees; but the temptation to fill up all the inequalities of the naturally uneven ground, and to make a smooth and level surface, had become too strong for the operator in his anxiety "to make a good job." Even if this levelling and filling up of the uneven ground had tended to produce no prejudicial effects on the trees themselves, it would have been a matter of extreme regret to have lost, not so much perhaps the natural beauty of the undulating ground—though that would be no light matter in the opinion of most persons—but to cover the spreading bases of the stems with their great root-prongs half out, half under the surface where they meet the ground, and thus ruthlessly destroy one of the most characteristic as well as picturesque features of all old trees, is an irreparable loss, and one which even the least observant of observers must feel. Unhappily, this is the pitiable condition of many of the trees now in question where the deepest fillings have been made. From the circumstance that many of these trees have been neglected and allowed to grow up without due regard to proper thinning, they are naturally in feeble health and all the more ready to suffer from the effects of any unkindly treatment. It is not necessary to add that in all this no blame can attach to any of the superintendents, since they can take no important step in the conduct of the parks without authority from head-quarters.—Robert Marnock, in *Garden.*

## THE RELATION OF CLIMATE TO THE GROWTH OF TREES.

An interesting and suggestive paper on the influence of climate upon trees was read by Sir Robert Christison, Bart., at a meeting of the Scottish Meteorological Society, in Edinburgh, on the 21st July, in which he proposed that the Society should institute an inquiry into the relation of climates in Scotland to the growth of trees. In the course of his remarks on the subject, he said that on examining a section of a tree trunk, it would be observed that there was a difference in the amount of wood in the various rings, and these variations were due to the circumstances in which the tree was placed at different periods during its growth. Doubts had arisen as to the uniformity of this rule, but he himself had never met with a single exception to it. These exceptions must be so very rare as scarcely to interfere with any practical application of the general rule. He then referred to a section of a tree which had been blown down at Barston, near Chesterfield, Derbyshire, in which there were 480 rings distinctly marked, and these rings were in some parts of the tree very irregular. If account were taken of the external measurements of trees they should be able to appreciate the influences in question which affected their growth, and by observing certain invariable precautions it was easy to obtain uniform and trustworthy measurements to the accuracy of a tenth or twentieth part of an inch. The main advantages of the method were that they could separate the influences of each season as regarded growth, and come to a definite conclusion in a short time, whereas hitherto they required several years for that purpose. His object was to ascertain whether the Meteorological Society would not find it suitable, with their great advantages and numerous opportunities of observation at their many stations, to organize a methodical inquiry into the influences of the various climates of Scotland on tree growth. The measurements would require to be ascertained and noted with the greatest exactness, and also the elevation and exposure precisely described and information given as exact as possible as to the cold in winter, and heat, sunshine, and rain from spring to autumn, as well as any other collateral circumstances, such as accidental injuries, and ravages of the insect tribes. As indicating the valuable results that might be obtained from the proposed inquiry, Sir Robert stated what he had himself observed last autumn in a wood at Dull, Strathtay, where the proprietor objected to thinning his wood. In this wood, he said, his attention was principally directed to the larches, which, taking the average of the most favoured localities, had, he found, grown during their first thirty-three years at the

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rate of one inch in radius in seven years. Taking this growth, and comparing it with a growth shown in a section of a larch from the Glamis grounds, which measured 12 feet in girth, and which was 110 years old, he found this—that in the Glamis larch there had been a growth of an inch during three years and a half for the first thirty-two years, and that it was therefore presumable that though the trees at Dull now looked healthy enough, they had ceased to grow at a profitable rate. He afterwards visited the wood on Drummond Hill, belonging to Lord Breadalbane, which lay on the opposite side of the valley to the one he had already described. He found that the best larch trees there were about 85 feet in height and 4 feet 10 inches in girth. On proceeding to ascend the hill he observed that great care had been taken to thin out the wood. He observed very little difference in the appearance of the wood for the first 200 feet of ascent. Suddenly, at the height of 800 feet above the sea, he came upon a shelf where the soil was much deeper, and there they found trees 7 feet 10 inches in girth and from 85 feet to 115 feet in height. As they went further up the trees diminished in growth. This showed that the effect of elevation, heat, exposure, and soil were all circumstances to be taken into account in explaining the variations in tree growth.

The Chairman, Professor Geikie, in concluding the discussion, said that he had no doubt the Council would be very glad to give Sir Robert Christison's suggestion the most careful consideration. There were two phases of interest in connection with this question—a prospective interest and a retrospective interest—inasmuch as while valuable for the guidance of arboriculturists in future, the inquiry might also yield much information as to the meteorological conditions of past years. Last year when in the great forests beyond the Rocky Mountains, he was struck by the uniformity of growth which he found in the trees; and evidently it was the case that for a long period before their final decay the trees which he had seen lying on the ground in thousands had not grown at all. They had exhausted the soil round them, and being simply encumberers of the ground, it had only needed some extra storm to uproot them. The proposal to remit the matter to the Council was then agreed to.

## THE RAIN TREE.

At the close of 1877 a paragraph went the round of the papers describing, on the authority of the United States Consul at Loreto, a tree existing in the forests near Moyobamba in Northern Peru:—"The tree is stated to absorb and condense the humidity of the atmosphere with astonishing energy, and it is said that the water may frequently be seen to ooze from the trunk and fall in rain from its branches in such quantity that the ground beneath is converted into a perfect swamp. The tree is said to possess this property in the highest degree during the summer season principally, when the rivers are low and water is scarce, and the

Consul, therefore, suggests that the tree should be planted in the arid regions of Peru for the benefit of the farmers there."

This singular story led to many applications to Kew, amongst others, from the India Office on behalf of the Agri-Horticultural Society of Madras and from the Société Economico-agraria of Malta.

Professor Ernst, of the University of Caracas, had already published a very similar account in the *Botanische Zeitung* (1876, pp. 35, 36). The tree observed was *Pithecolobium saman.* Professor Ernst states: "In the month of April the young leaves are still delicate and transparent. During the whole day a fine spray of rain is to be noticed under the tree, even in the driest air, so that the strongly tinted iron-clay soil is distinctly moist. The phenomenon diminishes with the development of the leaves, and ceases when they are fully grown." Professor Ernst attributes the "rain" to secretion from glands on the foot-stalk of the leaf on which drops of liquid are found, which are rapidly renewed on being removed with blotting-paper.

Mr. Spruce, the well-known South American traveller, has, however, obligingly supplied us with an explanation which appears quite complete as far as the original Moyobamba rain-tree is concerned. He writes:—

"The Tamia-caspi, or rain-tree, of the Eastern Peruvian Andes is not a myth, but a fact, although not exactly in the way popular rumour has lately presented it. I first witnessed the phenomenon in September, 1855, when residing at Tarapoto (lat. 6½° S., long. 76° 20′ W.), a town or large village a few days eastward of Moyobamba. . . . A little after seven o'clock we came under a lowish spreading tree, from which, with a perfectly clear sky overhead, a smart rain was falling. A glance upwards showed a multitude of cicadas sucking the juices of the tender young branches and leaves, and squirting forth slender streams of limpid fluid. . . . My two Peruvians were already familiar with the pheuomenon, and they knew very well that almost any tree, when in a state to afford food to the nearly omnivorous cicada, might become (*pro tem.*) a Tamia-caspi or rain-tree. This particular tree was evidently, from its foliage, an *Acacia.* Among the trees on which I have seen cicadas feed is one closely allied to the acacias, the beautiful *Pithecolobium saman.* . . . Another leguminous tree visited by cicadas is *Andira inermis,* and there are many more of the same and other families which I cannot specify. . . . Although I never heard the name Tamia-caspi applied to any particular kind of tree during a residence of two years in the region where it is now said to be a speciality, it is quite possible that in the space of twenty-one years that have elapsed since I left Eastern Peru that name may have been given to some tree with a greater drip than ordinary; but I expect the cicada will still be found responsible for 'the moisture pouring from the leaves and branches in an abundant shower,' the same as it was in my time."

This and other information has already been communicated to *Nature.* So much is reproduced here for the information of correspondents of Kew, many of whom continue to make inquiries upon the subject.

Professor Ernst is still of opinion that in Venezuela the *Pithecolobium* *saman* produces a rainy mist without the intervention of insects. In Jamaica and India the occurrence has not, however, been observed.

In the early part of the last century a similar story was placed on record and is to be found in "A Journey Overland from the Gulf of Honduras," by John Cockburn (London, 1735, pp. 40—42).

"Near the mountains of Vera Paz (Guatemala) we came out on a large plain where were numbers of fine deer, and in the middle stood a tree of unusual size, spreading its branches over a vast compass of ground. We had perceived at some distance off the ground about it to be wet, at which we began to be somewhat surprised, as well knowing there had no rain fallen for near six months past. At last, to our great amazement, we saw water dropping, or, as it were, distilling fast from the end of every leaf." —*Kew Report.*

## THE EFFECT OF LIGHTNING ON TREES.

A FEW days ago, during a violent thunderstorm, a tall poplar on the Cour de Rive, a street in the upper part of Geneva, was struck by lightning. Directly after the occurrence Professor Colladon, the eminent physicist, and one of the consulting engineers of the St. Gothard Railway, made a minute examination of the tree, and his observations, more especially as they are opposed to some generally received theories, and relate incidentally to the right construction of lightning conductors, may be not uninteresting to many of your readers. After remarking that his conclusions are based on the careful investigation of sundry similar phenomena, the Professor goes on to say that it is not true, as has been commonly supposed, that the gashes *(plaies)* found in the trunk of a tree which has been struck by the electric fluid are the parts with which the lightning first came into contact. The parts first struck are the highest branches, especially those most exposed to the rain. Thence it runs down the smaller branches—affecting almost the whole of them—to the larger ones until it reaches the trunk. These large branches, and above all the trunk, being much worse conductors than the small branches, the passage through them of the fluid produces heat and "repulsive effects," whereby the bark and sometimes the wood are torn in pieces, the bits being thrown a considerable distance, occasionally more than 50 metres. This theory, says Professor Colladon, is the result of numerous observations. It not infrequently happens that the upper branches and their leaves are destroyed—this is generally the case with oaks, which are often struck—but the leaves and young shoots of poplars and many other trees are such excellent conductors that they do not appear when struck to suffer any notable injury. This rule is so general that, though their trunks may be rent and their bark torn off, not more than two or three poplars out of 100 struck by lightning have their leaves shrivelled or even discoloured. This induction finds full confirmation in the condition of the poplar on the Cour de Rive, for it is not often in Switzerland that trees are struck by lightning early in May, when their leaves are young and tender. In this instance the principal and highest branch of the tree, on its south-western side, was the first with which the fluid came in contact. Its leaves and twigs, neither withered nor tarnished, were torn into minute fragments and scattered about on the ground. This was the effect, not of the lightning, but of the concussion of air, exactly as if there had been an explosion of dynamite or gunpowder; and the windows of two houses close by were broken in the same manner and by the same cause. Before even the professor saw the tree he had expected to find not far from it a spring or a stream of water; for the presence of water near the root of a tree is often the determining cause of its attraction for the electric fluid. In effect the professor found, five metres from the poplar, on its north side, a leaden water-pipe, and close to it a drain filled with waste water from a laundry. The principal fissure in the tree was also on the north side; and half-way between it and the water-pipe a plank lying on the ground had been pierced by a concentrated jet of the electric fluid as it flashed towards the pipe by the shortest route. Many trees, especially poplars, may be compared to buildings the lightning conductors of which are not continued to the ground. A building of this sort, if struck by the electric fluid, would in all probability remain intact in its upper part and be seriously damaged beneath the part where the conductor ceased. Hence, by far the safest part of a tree during a thunderstorm would be its topmost branches. This explains why birds are so rarely killed and their nests so seldom disturbed by lightning, while persons who have sought shelter under the spreading branches of trees are so often struck. The electric fluid, finding the trunk and the larger branches imperfect conductors, is easily attracted by surrounding bodies, whether they be bushes or human bodies. Large trees, especially tall poplars, placed near a house may serve as very efficient lightning conductors, but always on the indispensable condition that there is no well or running water on the opposite side of the house, for in that case the electric fluid, if it struck the tree, might pass through the building on its way to the water. In 1864 a house at Lancy almost in contact with a poplar on one side and a marsh on the other was set on fire by lightning, and the path of the electric fluid, from the point at which it left the tree, across the roof of the building to the marsh could be distinctly traced. Hence, in erecting lightning conductors it is desirable that their lower extremities should terminate in a stream, a well, or a piece of damp ground. The plant most sensible to electricity is the vine. When a stroke of lightning falls in a vineyard the leaves affected are turned red-brown or deep green, a circumstance which shows, in the opinion of Professor Colladon, that the electric fluid descends in a sheet or shower, and not in a single point, the number of vines touched—sometimes several hundred—by a single *coup* proving that the lightning has covered a wide area. This fact lends additional confirmation to the theory that lightning disperses itself among the smaller branches of trees and over ground covered by vegetation."—*Times*, *May* 18.

**Unripened Shoots and the Winter's Frosts.**—The innumerable dead shoots which are at the present time visible upon the timber trees as well as the fruit trees growing in wet soils, point strongly to the necessity for more thorough drainage of these lands. In a season like that of 1879 it is impossible that much of the new growth can become properly ripened; still this may be greatly aided by a timely attention to the requirements of the land, and losses both in timber and fruit may be mitigated. Good open drainage for timber growing upon clay soils is indispensable, and whoever neglects to secure this must expect to pay a heavy penalty.

The Golden Cup Oak (*Quercus chrysoleps*) is a puzzle to botanists; and well it may be, since it occurs as a lofty forest tree and as a tiny bush. Dr. Kellogg, of San Francisco, pronounces the dwarf form a distinct species, but Dr. Englemann, of St. Louis, though the difference in size is so great, believes that one species includes both extreme forms. A California botanist, Mr. J. G. Lemmon, who has lately made an extended exploration of the High Sierra back of Yosemite, sides with Dr. Englemann, and says that on the various slopes about Yosemite and elsewhere in the Sierra he has found specimens grading all the way from a tiny prostrate bush, loaded with small, smooth-cupped acorns, to the tall, majestic tree, bearing yellow-golden dust-covered acorn cups 2 inches across.—*Scientific American.*

**The Biggest Tree.**—The *Eucalyptus amygdalina*, the "Giant Eucalypt" or "Wangara," is considered to be the tallest of known trees. It flourishes chiefly in the humid southern and eastern districts of Victoria, extending to the Blue Mountains in New South Wales, and ascending to about 4,000 ft. in elevation. It does not stretch into Western Australia, though frequent in Tasmania. Its most favourable habitat is where neither subject to severe frosts nor intense moist heat. It varies according to geological situation. Thus in the irrigated ravines of the cooler ranges it sends up its straight white stem to a towering height. Mueller gives the tree an approximate height of 400 ft. In one fallen tree measuring 420 ft., the length of the stem to the first branch was 295 ft.; the diameter of the stem at the commencement of the ramification was 4 ft.; at 70 ft. higher the diameter was still 3 ft. Another tree, at 3 ft. from the ground, was 53 ft. in circumference. The Rev. Thomas Ewing measured a prostrate tree, showing a height of 220 ft. up to the first branch; the top was broken off at 64 ft. above this; the basal diameter was 30 ft.; the stem diameter at 220 ft. was still 12 ft., so to that distance this single tree would yield more timber than three of the largest oaks taken together with their branches. And within a square mile were at least a hundred trees, none less than 40 ft. in circumference at the base. Mr. G. Robinson noticed in the back ranges of Berwick the circumference of a stem to be at least 81 ft. at a distance of 8 ft. from the ground. The same gentleman, a surveyor, obtained at the foot of Mount Baw-Baw an exceptionally large tree 471 ft. high. At the Cape Otway ranges a tree was noted 415 ft. high, with a basal diameter of 15 ft., although the loftiest trees have not always colossal stems. The timber of this tree does not twist, and is useful for many kinds of carpenter's work. It has been introduced into naval construction. It has failed in mining works, but yields an excellent fuel. A labourer has in some instances split 620 palings of 5 ft. length from a stem in a day. The leaves of this eucalyptus yield a valuable oil—so much as 500 oz. being obtained from 1,000 pounds of leaves. It dissolves gutta-percha readily, and may be burned as petroleum is in lamps, though with a distinctive odour; it is of great therapeutic value, and has been introduced in the manufacture of varnishes. The wholesale price of the oil is, in England, 3s. per gallon. This species stand foremost as the health tree for malarial or fever regions. Prince Pierre Troubetzkoy has recently confirmed Von Mueller's judgment in regard to this at Lago Maggiore. There the *E. amygdalina* grew 60 ft. in nine years, and endured a temperature as low as 18 degrees, proving harder than *E. globulus* and *E. rostrata*.—*Garden.*

NEW PARK FOR DUBLIN.—St. Stephen's-green was opened on June 27th, as a public park by Lord Ardilaun, who has laid it out for the citizens of Dublin, at a cost of £20,000. The works have been in progress for two years, and Lord Ardilaun personally superintended them during nearly the whole of that time, suggesting many of the improvements which have been carried out. The park was much admired by the large crowds who in the afternoon visited it. The cost of maintaining the ground in repair will amount to about £1,200 a year, which sum will be defrayed by the Treasury through the Board of Works.

THE USES OF FERNS.—Those who have been fairly inoculated with the love of ferns will be interested to learn that many species of these beautiful plants are used not only for food and medicine, but for economic purposes. As food they are chiefly useful to the aboriginal inhabitants of some foreign countries. In the larger of the exotic ferns—the tree-like species—the inner part of the stem, stipes or rhizoma—corresponding to what would be the pith in other plants—and sometimes the whole of the tuberous rhizoma is eaten generally after being boiled. In India some of the natives boil the tops of one specie of fern, and eat it with shrimp curry. Amongst ourselves, two of the most beautiful species—the Bracken and the Male fern—are said to have been sometimes used as ingredients in the manufacture of beer; whilst one foreign species (*Aspidium fragrans*) is actually stated to have been used for making tea. Our native Maidenhair used at one time to furnish a principal ingredient for a syrup called "capillaire." . . . The rootstock of the Royal fern (*Osmunda regalis*) was in times gone by reputed to possess the quality of healing wounds, whether applied to them externally, or taken inwardly in the form of a decoction. Its outward application was considered a specific against bruises or sprains, and good for bones broken or out of joint; and taken inwardly, it was also believed to be good for cholic and splenetic disorders. In some parts of Europe its rootstock is said to be used, after being boiled in water, for the purpose of starching linen. . . . A pleasant and familiar inhabitant of our lanes and woods—the Common Polypody (*Polypodium vulgare*),—has had ascribed to it, by ancient herbalists, various medicinal qualities, amongst them being the power of curing coughs, and asthmatic affections, the dried rhizomas being powdered for the purpose and mixed with honey.—*The Fern World.*

PAULOWNIA IMPERIALIS.—Among the curiosities on exhibition at the meeting of the Indiana State Horticultural Society, held at Dublin, Wayne County, Indiana, December, 1879, was a specimen of Paulownia imperialis which had made the enormous growth of 15 ft. in height and 5 in. in diameter in one year. The original tree was planted several years ago by a resident of Dublin on his lawn, but the winters are too severe for it, and each year it dies to the ground, but the root remains uninjured, and in spring throws up from two to four shoots that make imilar enormous growth.—*Garden.*

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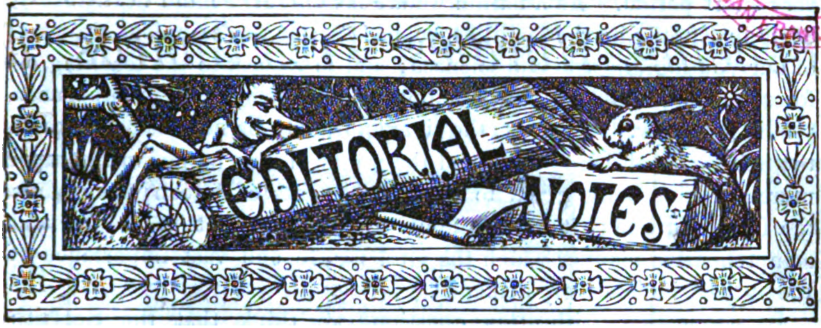

If there is one topic more deserving than another of careful study by all interested in forestry and its future prospects, it is the education and training of our young foresters. To them will fall the important work of rendering our woods and plantations still more profitable than they have hitherto been, and of making useful and valuable some hundreds of thousands of acres of waste or barren lands in the United Kingdom which at present are of little or no benefit to the unfortunate owners. Then, when we look abroad we cannot fail to see the vast field which is rapidly opening out in India and the colonies for the employment of the best trained arboricultural skill which education and science can produce. With such a prospect before us, it is really astonishing to see the amount of apathy displayed in reference to this important subject by those whose duty it should be to institute and carry out a thorough scheme of education and training for the foresters of the future In the midst of political wrangling and financial cheese-paring, such a matter is not likely to attract the attention of any Government unless those who are more directly interested take the most effective means for pressing the subject upon the notice of the Government of the day, and incessantly persisting in their endeavours to draw attention to the question till their object is fully accomplished.

In doing this the landowners of the country can lend most valuable aid, and as they will ultimately reap the greatest benefits from an educated and improved system of forestry, they ought, in the nature of things, to take a leading part in promoting the question of the creation of a British institution for the special teaching of arboricultural science. Nor, with few exceptions, do foresters show the desired amount of earnest enthusiasm which we have a right to expect from an intelligent body of men on a subject that so vitally concerns themselves. Such a state of indifference is however, we believe, becoming a thing of the past; and if landowners and foresters will only rouse themselves to a true sense of their responsibility, and strenuously press the question upon public attention, its solution is only a matter of a very short period. As a nation we are lamentably behind nearly every State in Europe in the facilities we possess for the technical training of our youth in the arts and sciences; and in respect to the teaching of forestry, it is totally unknown among us, and completely ignored as a public necessity. However, the time appears to be near at hand when the exigencies of landowners and the wants of the nation will compel more attention being given to the requirements of forestry, and when the Legislature must take up the question and treat it in the full and comprehensive manner which the vital nature and vast importance of the subject imperatively demands.

In connection with this question, we think that the Scottish Arboricultural Society has heretofore been somewhat remiss in the part it has played in advocating and promoting a thorough educational training of young foresters. It has at various times offered prizes for essays on the subject, and appointed committees to discuss and report thereon, but so far as known to us, with nothing but barren results. We cannot but think that such a prosperous and influential society should have been able before this advanced day to have recorded its views in some definite and authoritative form upon a matter of such deep interest to its members as that of the technical education of the professional forester. With the means and talent which the society can command, there ought to be no difficulty in the way of drawing up a clear and definite statement of the educational wants of forestry in this country, and then placing it before the proper authorities, backed up by the whole weight and influence of the society, so that the decision arrived at may be carried out with dispatch and in due form. This important matter should form the chief subject for treatment and discussion at the annual meeting next October, when the committee appointed at the last annual meeting to investigate the matter give in their report. Young men who are anxiously looking forward to the time when they will be able to receive an education and training in this country at a moderate cost, which will duly qualify them for aspiring to hold the highest offices in the forest department, or as a forester in any part of the empire, will watch with much anxiety the decision arrived at by the Scottish Arboricultural Society, and the action taken by it in carrying out a complete scheme of forest education in accordance with modern science and the requirements of the age. The society must be up and doing, letting its voice be heard and its influence felt at all times and at all seasons in promoting the interests of forestry, and especially in raising the status, educationally and socially, of foresters.

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The summer excursion of the Scottish Arboricultural Society has again been carried out in a most successful manner. The members who were so fortunate as to join in it appear to have derived a vast amount of instruction, as well as a tolerable share of pleasure during their two days' ramble through the woods and vales of Peeblesshire. The route was a long and trying one, and the arrangement of the programme must have been made with the greatest care and knowledge of the country, so as to enable the excursion to get over the ground within the allotted time. From the very full and interesting report of the proceedings, which we are enabled to give on another page, the work set before the party seems to have been carried through with unflagging zeal and unusual promptitude, every point being reached at the appointed time, and no time lost or item omitted from beginning to end.

The district selected was a very attractive one, and members travelling from great distances to visit it on such an occasion were abundantly rewarded for their trouble and outlay. The numbers, although fully an average of former occasions, appear to have been largely made up of landed proprietors and others, all keen arboriculturists undoubtedly, but without the proportion of professional foresters which every one interested in arboriculture would like to have seen present. On such an occasion the forester element should be far more numerously represented, and it is because these excursions are specially for the benefit of foresters that such instructive gatherings can be most strongly advocated. Every forester in the country would derive as much useful information from a day or two spent in this manner, visiting the woods and plantations on other estates and meeting other foresters, as he would probably obtain in a whole year in solitary seclusion on any one estate in the kingdom.

We do not see any good reason why foresters should not turn out once a year in scores, or even hundreds, to join in these excursions for mutual benefit. Their employers ought to make a point of seeing that they do so, in order that the management of their woods and estates generally may be conducted on the soundest economic principles, and in accordance with the best practice of the day. When next the arboriculturists muster for an excursion we hope to hear that every district of the country has sent its quota of professional foresters to swell the ranks and to add to the general store of collective knowledge, receiving in return fresh ideas and much information of a useful and practical nature.

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A CORRESPONDENT has sent us the following details respecting an attack of the Pine Weevil, *Hylobius Abietis*, on some young *Cupressus Lawsoniana*, in the Co. Roscommon. The ground had been occupied by a Scots fir plantation which was cut down about four years ago, and since then it has been planted with ornamental trees and shrubs, amongst which there are some nice young specimens of *Cupressus Lawsoniana* now between 6 and 7 ft. high. They have lately been severely attacked by the pine weevil eating the bark and threatening to completely destroy them. The weevils have been bred upon the roots and *débris* left on the ground when the crop of Scots fir was cleared away. They have attacked only the cypress, and with a view to stop their ravages and save the trees, inquiries were made as to the best means to adopt to prevent the insects getting at the plants. The plan followed so successfully by Mr. McCorquodale at Scone was recommended, and at once carried into effect,—viz., beating the earth smooth and firm for about eighteen inches radius around each tree. The same plan with the addition of a thick sprinkling of hot lime all over the smoothed surface was also tried; and both plans have been so far effectual that no insect has touched the trees so as to damage them ever since these preventitive processes were carried out about two months ago.

Still another process of a somewhat novel nature was tried, so as to make doubly sure, if possible, of saving some of the specimens. Some light cardboard was procured, and cut into a round shape, about ten inches in diameter. It was then split from the centre to one side, and the centre cut out, just sufficient to fit tightly to the stem of the tree, two or three inches above the surface of the ground. Being fitted on to the tree, a few small holes and a bit of string afforded the means of firmly fixing it in its position—something in the shape of a deep saucer with its mouth downwards; the under side being smeared with tar, it has proved a most effectual barrier to the inroads of the insects. This plan is a most effective one, so far as the upper part of the tree is concerned; but as the weevil often attacks the bark of young trees, just at the surface of the ground, it would be more effective as a protection for them if the tarred circle of cardboard were laid close down on the smoothed surface of the soil, and tarred on *both sides*, so that the weevils could neither pass under nor over it. The plan is an excellent one for the protection of young specimen conifers and other trees from the ravages of weevils, beetles, and similar crawling vermin.

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We are informed that the subscription list for the Testimonial to Mr. McCorquodale, of Scone, will shortly be closed; it is therefore desirable that all intending contributors should forward their subscriptions, with as little delay as possible, to the *Treasurer*, Mr. David Mitchell, 6, Comely Bank, Edinburgh, so that the necessary arrangements can be made for the presentation being carried out, as proposed, at the annual meeting of the Scottish Arboricultural Society on the 5th of October.

# Steam Cultivation.

By ALFRED J. BURROWS, Land Steward, Pluckley, Kent.

The rapidity with which improvements in steam cultivation have followed each other, and the almost universal application of the steam plough, grubber, and scarifier to the preparation of the land for the purposes of the agriculturist and the arboriculturist, wherever their operations are conducted on an extensive scale, furnish the strongest arguments in favour of the system. That the powers of steam have in some instances been abused, and that a diminution rather than an increase of crop has resulted from an injudicious use of the steam plough, furnishes no argument against the legitimate use of a system at once cheap in its application, rapid in its action and in its effects, and thorough in its results. Solitary instances of decreased cereal crops since the introduction of steam power may be attributable to the fickleness of the seasons, or to a misapplication of the forces employed; but these weigh but little in the scale when opposed to the volumes of evidence adduced in favour of a well-tried system.

In these days, when the payment of high wages is met by a lessened amount of manual labour of very inferior quality, an entire dependence upon the work of men and horses for the performance of the principal tillage operations of a large estate would be almost as great an impediment to high and profitable farming as a return to the old flail and threshing-floor for beating out the produce of the fields. To retrograde movements of all kinds the present unremunerative prices of our cereal crops have effectually closed the door.

One of the greatest recommendations of the system of steam cultivation is to be found in the facilities it affords for commencing the cleaning and preparation of land immediately a crop is cleared off, and while the horses are still busy with the harvest. Upon heavy clay lands in particular the end of summer and the autumn months are the only seasons in which these operations can be effectively and economically performed without loss of crop. Working at this time of year is of vital importance to the clay land farmer. Speaking of its benefits, Mr. J. C. Morton says in his *Farmer's Calendar*, "For the clay land farmer, especially, the benefit under both these heads—expenditure in the stable and efficiency in the cultivation—by substituting steam power for horse labour is enormous. He, much more than the light land cultivator, needs to keep a large team of horses throughout the year for the sake of their work during three or four months; and he, too, more than the other will benefit by that completer tillage which steam power can effect. On our stiffest clays on many farms six horses per 100 acres are no uncommon allowance, while on lighter soils one-half that number will suffice. And on such heavy soils the trampling of the team beneath the furrow slice produces a hardened floor which necessarily interferes with fertility, confining the soil, indeed, to a mere shallow layer of tilled earth instead of permitting the roots of plants to expand freely throughout that greater depth from which nourishment will be drawn as soon as by a steam-drawn implement, involving no pressure on the subsoil, that floor shall have been thoroughly broken up."

Upon well-drained lands, or land with a naturally porous subsoil, it is the system *par excellence* which commends itself to the scientific farmer and the tree planter as the only one which can be looked to for results sure and satisfactory.

The advantages of an early and a thorough steam cultivation will be more apparent when we come to consider the main objects of tillage operations, the principal of which are thorough pulverization and cleaning. The most efficient implement for these purposes must be the one which thoroughly breaks up and stirs the land without the treading of horses. By being left loose and open throughout the winter it is in a much better state to benefit by frosts.

Among the many benefits derived by trees and plants of all kinds from a thorough loosening and pulverization of the soil, none are more marked than those dependent upon the facilities thus afforded to the roots to travel widely in search of that food which the soil everywhere contains. As a result of the constant treading of horses a compact and almost impenetrable pan is formed below the depth to which the plough and the cultivator descend. The first result of the breaking up of this hard substratum is that during a wet season the rain-water freely descends to the drains or to the porous subsoil, and during a very dry time the water in the subsoil rises by capillary attraction for the sustenance of plants.

The advantages of a deeply cultivated and finely pulverized soil in a season of drought are shown by some experiments made by Professor Wrightson. He found that in finely powdered clay the water into which it was plunged at the base rose to a height of 36 inches; in loamy clay nearly the same height; in sandy soil about 20 to 28 inches; and in clay not powdered but reduced to small lumps from 5½ to 12 inches. The finer the interstitial spaces the higher did the water ascend.

Land which affords a proper ingress as well as egress to water will be found the most fertile, provided it be sufficiently retentive to hold the quantity necessary to vegetation. The necessity for a fine tilth will be seen when we consider that every subdivision of the particles of matter contained in the soil extends its superficies and therefore its porosity; while its power of absorbing and retaining water and the carbon dioxide, ammonia, and nitric acid conveyed to it by rain-water is thereby greatly increased. From experiments made by Professor Way in 1856, it was discovered that the rain and snow which fell upon an acre of land brought down 8·31 lbs. of nitrogen in the form of ammonia and nitric acid.

The gradual descent of water through the soil is followed by that of air, the oxygen from which causes the more rapid decay of vegetable matter. In the absence of oxygen only a slow and partial decay takes place, the result of which is that substances injurious to vegetation are formed. As an example of this we may mention the sulphide of iron, formed wherever oxygen is wanting. From what has been stated above it will be seen that one great object to be attained by thorough drainage and deep cultivation is to enable the rain-water to pass through the soil. In importance this is second only to the removal of stagnant water.

Wherever shallow cultivation is long continued, lime and some other manurial agents in the course of time sink beyond the reach of the roots of many of our cultivated crops. By deep stirring these are either brought nearer the surface or so liberated that they are reached and assimilated by the descending roots. By the exposure to the sun and the atmosphere the fertility of a soil is considerably increased. One of the most active agents of this is seen in the oxidation of the particles of which the soil itself is composed. The oxide of iron present in the soil, upon exposure, takes in oxygen, and this is imparted to the surrounding soil as soon as it becomes buried beneath the surface. In this way both oxygen and ammonia are disseminated. The deep stirring of the lower stratum of a soil sets free the organic acids formed while stagnant water was present, and these come immediately under the action of the pure oxygen. As the water sinks through the loosened subsoil, it also carries down many noxious substances at the same time that it brings in others of great value.

For clearing land of weeds, and more especially of couch, the steam cultivator is the most efficient implement; for while the plough cuts this in pieces and scatters it broadcast over the soil, where it is afterwards replanted by the treading of horses, the cultivator brings it whole to the surface, from which it can easily be removed, or where it may at once be collected and burnt.

Whenever the season will permit the work to be continued with little interruption, the perfection of autumn cultivation upon heavy and foul land would seem to be a shallow cultivation immediately after harvest, to clean the land and provide a fine seed-bed for the germination of the seeds of weeds; next a deeper stirring to destroy these; and lastly the winter furrow, proportioned in depth to the nature of the subsoil, the previous preparation this has received, and the requirements of the following crop. By such a system, and by turning the furrow at the proper angle to expose the greatest possible surface to the action of winter frosts, an immediate seed-bed may be secured for cereal crops, a proper cultivation for the roots of trees, or a deep, fine, moist, and clean bed for root crops in spring. In this way mechanical appliances come to the aid of natural forces, assisting to convey to the soil heat, moisture, purifying air, and that arch-pulverizer, frost. Tillage properly applied and suitably timed acts as a substitute for that mortar pounding without which many refractory substances cannot be brought into a soluble state.

By early autumn cultivation and an avoidance of all treading and poaching in wet weather, the land should be in a fit state for the completion of all spring and early summer operations without the aid of clod crushers and heavy rollers. The office of these should be not to coerce heavy lands but to consolidate light ones, to press the soil closely to the roots of plants, to stop the ravages of wireworm, or to decrease evaporation by smoothing the surface. But to apply them to clay lands with an idea of producing a proper tilth is a likely way to reduce the texture of the soil itself to the worst possible condition for the reception either of seed or of young plants.

In ploughing during the autumn for a crop of spring corn or roots it is but seldom that proper attention is paid to the position in which the furrow slice is placed by the plough. To enable the land to derive the greatest possible benefit from frosts and from the weathering influences generally, this should be tilted at an angle of 45°; and if that part of the furrow which lies uncovered upon each side is to be equal to the depth of the furrow, the proportion of depth to width should be nearly in the ratio of 2 to 3,—or to put it more correctly, a furrow 9 inches wide must be about 6½ inches deep. By the same calculation a furrow of 9 inches deep, such as may be required for leguminous or root crops, would require to be ploughed 12½ inches wide.

The injurious effects of large quantities of water running off the surface of arable land may be seen at the bottom of an open or finishing furrow upon tolerably open or sandy land, where the space becomes more or less silted up by the small stones and sandy particles, while the richer and more soluble matters have been carried away by the rain. Upon properly drained land with deep cultivation there need be no such thing as an open furrow after planting.

One great result of thorough cultivation and exposure before winter is that the double silicates of the soil are brought in contact with the atmosphere, by which they absorb ammonia. The action of these double silicates was discovered by Professor Way, who showed that in the silicate of alumina part of the alumina was replaced by lime, soda, potash, or ammonia. The silica or silicic acid forms a principal ingredient in sandstones, and in crystalline and granite rocks. It becomes a silicate when it combines with alkalies or with an alkaline earth. Thus clay is a silicate of alumina, being composed of silica combined with alumina.

Among the necessary preparations for successful and economical steam cultivation may be mentioned good drainage and the formation of large enclosures by the grubbing of hedges. Where heavy machinery, such as traction engines, is employed, good drainage and firm roads or headlands are especially necessary, and even with lighter engines these are a decided advantage. Small fields and crooked hedges necessitate so much loss of time in the removal of machinery and the adjustment of corner anchors that their cultivation becomes expensive and unsatisfactory.

Mr. Fowler, in his evidence before the Gloucestershire Steam Ploughing Company, states:—" The whole question of steam ploughing depends upon whether the fences are cleared or not. So much time is lost in shifting and arranging the tackle and making fresh adjustments in small fields as to render it impossible for the men to go on. The one requisite of large fields was all that was required. If the fences are to remain as at present it is not possible to do it except at a cost considerably greater than that of horses. The cost of steam ploughing is entirely a question of clearing those beggarly fences. If people will have game instead of good farming, steam ploughing must go to the wall."

Steam ploughing is particularly applicable to the reclamation of heath land, where the formation of an ochreous deposit, a few inches beneath the surface, makes it almost impossible to break up the land properly with the implements ordinarily drawn by horses. The formation of this impenetrable pan is due to the combination of the salts of iron with the tissues of the heather. As the heather dies the ferrous salts descend through the soil and form a kind of cement. Upon calcareous soils, also, an almost impenetrable substratum is similarly formed when the cultivation is shallow. The indurated pan can be thoroughly broken up only by the application of steam power, or by the use of an effective subsoiler.

Deep cultivation is especially valuable upon alluvial soils where the subsoil is generally of a good character. Some portions of a tenacious clay subsoil may be broken up with advantage after drainage. But the introduction of steam ploughing and steam cultivation generally may render it necessary to modify to some extent the after management of land with regard to the application of manures; for to misunderstandings upon this point many of the evils complained of may be attributed. Where the subsoil is gravelly or rubbly, and therefore open, manures applied in the autumn or winter for spring and summer crops will be washed down below the reach of the roots.

That early cultivation of land in autumn which the use of steam renders possible entirely does away with the necessity for bare fallows, and even bastard fallows may be dispensed with except in the case of the very early spring crops. It also affords time for that attention to meadow lands—dressing, rolling, and dragging—which these so much require.

Many people have been deterred from a further use of steam tackle by the cost of a first trial, which must naturally prove to be the most expensive on account of the extra work it involves upon unprepared land. But it is unfair to compare one steam ploughing or cultivating with the same operations performed by horse labour, as the former when well done proves equal in its effects to a whole season's work with the latter. Another deterrent cause is to be found in the numerous accidents to the machinery which have been met with where its management has been entrusted to careless or inexperienced hands. The necessity for something like intelligent supervision is obvious to all, for no one should be expected to start and work expensive and complicated machinery who has not had some experience in its uses; and judging from the results recorded in our agricultural journals, and the accounts given by writers upon the subject generally, it is in those cases where the closest supervision has been given by the owner of the tackle that the best results have been obtained.

For the purposes of the tree planter upon heavy soils the preparation of land by steam cultivation is far in advance of that afforded by horse labour. Trenching by hand is both a tedious and an expensive operation, and one which requires constant supervision to get it well done. Pitting for plants upon such soils proves to be about the worst possible preparation when autumn planting is followed by a very wet winter. The water naturally draws to the holes in which the trees are placed in the loosened soil, and these retain it like so many cups. Deep steam cultivation breaks up and loosens the whole of the subsoil to the depth chosen, and thus affords every facility for the spread of the roots and the removal of the surface water. A thorough steam cultivation, followed up by cutting good open ditches, is all that is required in the most retentive soils.

With regard to the advantages of steam culture the evidence of Mr. George Pocock, of Bourton, in Wiltshire, is to this effect:—"The character of the staple and subsoil has been materially improved by the absence of trampling and the deeper steam tillage, so much so that the strong bits are not like the same soil. From twelve to fourteen horses have been dispensed with, a saving of upwards of £400 a year on labour outgoings has been thus effected, while the value of the produce has been greatly increased."

After reading various conflicting statements with regard to the results of steam cultivation, I wrote a letter to the editor of the *Agricultural Gazette* upon the subject, which appeared in its columns on the 28th of June, and from which the following is an extract:—"It is contrary to science and contrary to our every-day experience to suppose that the steam plough, when properly used, does not add to the yield of land by placing plant food more within the reach of the crops. Two years' use of a Fiskin tackle upon a home farm of nearly 900 acres, comprising heavy clay land, light brashy land upon Kentish rag, and a considerable breadth of sandy land upon gravel and flints, have enabled us to alter very materially for the best the appearance of the crops; and at the present time about seventy acres of wheat, forty acres of oats and barley, twenty acres of peas, and fifty acres of wurzel, swedes, carrots, white turnips, and potatoes, all upon land steam-cultivated in the autumn and the beginning of winter, are looking as vigorous as one could desire to see them. Part of the land is drained and part undrained; but in nearly every instance deep stirring preceded deeper ploughing. The largest field of wheat (thirty-five acres) was drilled upon a steam-ploughed clover ley about the middle of October; and for several days after the drilling a heavy Cambridge roller was kept going over it from morning till night. This was followed by a dressing of thirty yards of chalk lime, carted on and spread early in the winter, as the slugs threatened the destruction of the young plant. The wheat is now in full ear, and it promises an early and an abundant crop.

"It is evident that upon heavy and undrained lands deep stirring should precede deep ploughing; and if such an operation is well carried out after drainage, many noxious substances contained in the soil will be washed down and carried away through the drains, or changed by the aëration of the soil. To plough up three or four inches, or even more, of fresh soil upon the first introduction of steam cultivation would upon some lands prove fatal to the prospects of a crop."

In the next number of the same paper Mr. Mechi writes:—"In my private conversations with numerous farmers and farm labourers I hear many adverse statements of diminished crops and heavy loss caused by the injudicious use of steam power in cultivation, and it is on this point I ask my agricultural friends to speak their minds or write their experience. My own is, that too great a disturbance of the subsoil and its admixture with the surface soil cause a loss; and even where that admixture has been made by extra horse-power or by steam power the result has been injurious. My practice has always been to cultivate deeply, but to keep the subsoil in its place, and only let it mix very gradually with the top soil. As a weed-killer the steam plough is *ne plus ultra*, for it tears them from their beds, and they soon die in or on the untrodden soil. If I, who had been for so many years a deep subsoiler, suffered from deep steam ploughing, what must it have been to those who had only been previously shallow cultivators! Too many of us have rushed too suddenly to deep cultivation instead of a mere deep disturbance of the poor subsoil, and have thus impoverished the seedbed by an undue admixture with it of poor unaërated subsoil. A good gardener who double-trenches takes care to keep the second spit under the top one, especially if the subsoil is a poor one. It should be remembered that one inch of depth of subsoil is one hundred tons per acre; and that if we intermix with the four or five inches of top soil an additional two inches of subsoil, it is a dressing of poverty equal to 200 tons per acre."

But after all, the character of the subsoil must to a great extent regulate our procedure in steam cultivation, for what may prove beneficial upon a deep alluvial soil may have a contrary effect upon shallow lands. In cases of diminished produce which have come under my own observation this has generally been attributable to the loose state in which the land was left after planting. Upon the deep rich soils of Romney Marsh this is especially observable. The young plant lacks that firmness of seedbed which it obtains where the land is ploughed and entirely worked by horses. But the remedy is at hand and easily applied; additional treading at the time of sowing, and heavy rollings early in spring, will go a great way towards counteracting the effects of the looseness induced by steam ploughing.

It is but seldom that experiments in the reclamation of land, whether for the purposes of tree planting or for the production of corn and root crops, are conducted upon such an extensive scale as those commenced by the Duke of Sutherland at Uppat in 1871, and since carried on without intermission. The cost of these has, in many instances, far exceeded the value of the land; but the advantages conferred are to be considered more in their relation to the large area permanently benefited than in their bearing upon the smaller plots operated on. By the breaking up of suitable spaces in situations where these can be utilized, in the centres of extensive sheep runs, for the growth of the necessary winter food to carry on large flocks which used to be sent away to fatten the deterioration of the land is arrested, and lasting advantages are conferred. An interesting and detailed account of these works, upon which a sum of upwards of £148,000 has been expended in the course of ten years, is given in the *Journal* of the "Royal Agricultural Society," No. 30. There the work is spoken of as "an effort to arrest the gradual exhaustion of the soil and the consequent impoverishment of the estate." Upon parts of the land which were covered with birch, steam power was employed for its removal. Strong chains were placed round the trunks of the trees, and these were connected with the wire rope, when they were uprooted by a pull from one of the engines. The means by which successive difficulties were surmounted as they arose, the use of dynamite for removing roots, the introduction of the revolving disc coulter to cut through obstacles or carry the plough over them, and other equally ingenious devices, furnish an interesting chapter in the annals of reclamation.

(*To be continued.*)

## A NEW USE FOR THE WOOD OF HERMINIERA ELAPHROXYLON.

The uses to which the soft, pith-like woods, such as that of *Æschynomene aspera*, are put, are, for the most part, limited to carving and ornamental work in the countries where the plants are native. The adaptation of the particular plant just mentioned in the manufacture of Shola or Sola hats is perhaps an exception to the rule; latterly, however, the *Æschynomene* and other similar soft woods have been applied for the "packing" of machinery bearings, and among the woods upon which experiments have been made that of a Leguminous plant, *Herminiera elaphroxylon*, native of the Nile country, has attracted some notice. Upon trial, however, the wood was found to wear away the machinery bearings packed with it, as well as to blunt tools very quickly in cutting it; consequently the wood was found valueless for machinery purposes. It has quite recently been applied to another and entirely different use by Mr. Thomas Christy, who has introduced it to notice for razor-strops. The wood, which is extremely light, much resembles in general appearance that of the Shola. The tree is called the Pith-tree of the Nile, and is also known as the Ambash, or Ambatscha. It grows to a good size, forming a tolerably thick trunk, and is said to be so rapid in its growth that in three years it almost choked the channel of the Bahr-el-Gazelle. Owing to its extreme lightness the natives use it to assist them in swimming across the river. The properties of the wood which cause it to be unsuited for delicate machinery, in consequence of wearing away the metal and in blunting knives used for cutting it, are, on the contrary, recommendations for its use as razor-strops. From the flower-stems of the American Aloe (*Agave americana*) pieces are often cut and shaped by the people in the countries where it is abundant into the form of strops, and though there is no doubt of its efficacy for this purpose, the wood of Herminiera is more compact, even-grained, and apparently more durable.
—*Gardeners' Chronicle.*

# South Australia—its Forest at Wirrabara.

We were two, reclining in easy chairs, our thoughts sometimes here and sometimes there; our table, covered with cloth of "velvet pile," made an excellent resting-place for our understandings. I mean to say our feet were on the table, and our souls in full view of each other, so we understood our to-morrow's holiday was to be spent in a ramble to the nursery of the Wirrabara Forest Reserve, despite the notices meeting our eyes at intervals that leave was required from officials previously. So the morrow dawning in splendour and promising a goodly amount of sunshine, the natural taste provoked for anything in the way of a sylvan scene inherited from our respected parents, we wend our way to the valley of the Ippinitchie, where the influences of the place make one feel he is once more "born for enjoyment," to lie and smoke a careless pipe, and listen to the chuckle of an amusing bird known as the "laughing jackass," and the merry twit of the numerous parrots as they dart in thousands through the air or among the branches far aloft in the "old monarchs" of the forest that haunt the banks of this pretty stream, the Ippinitchie Creek, as it steals noiselessly along to join its sister stream below. Barney, my friend, suggests we make a halt and explore the natural beauties of the place on foot; so dismounting, and tying the reins in a manner that the horses will not tread on them, we leave them to enjoy themselves while we mount on the hills that are directly skirting the small plat of about 100 acres that lies spreading out before us, with the "Forest Officer's" stone residence of four rooms on our left hand, looking directly into the aforementioned stream; and forming a background to the picture is the continuous line of old "Red Gums" (*E. rostrata*) on the banks of the creek, and the further edge fully stocked with seedlings of natural seeding from the *E. leucoxylon* and others that once covered this valley so finely adapted for the production of timber. On making inquiries as to nature, &c., of these seedlings, we are informed it is a fact that some of them have grown no less than twenty feet within one season. The soil here is a rich sandy loam resting on gravel and a retentive "iron clay," or red clay, and those seedlings that have made this extraordinary growth are Blue Gum, that have had a stirring of soil about them and pruned judiciously. The Red Gum seedlings are looking equally vigorous, but on close inspection we find twenty-five per cent. with a piece of bark removed from them, about the size of a child's hand, close to the ground, generally speaking, but I have seen it at various heights. Well, if you look close you will find a web-like substance somewhere in this incision, and on its removal is observed a hole about the size of one's little finger; and if we go so far as to cut the tree down and split it through the middle, it will be found to enter the very heart and run at various heights up the "pith" (or place of same, there being very little if any pith in the *E. rostrata*). I have seen this tunnel some thirty-six or forty inches in length in a stick, growing in a moist vegetable soil, and at the end of the hole is found, the enemy, a fat, bloated, yellowish-white grub, sometimes pinkish-white, as big and long as a finger. It is the larva of a large brown goat-moth known by scientists as the *Zengera Mackayi*. It is to be seen in its mature state about May, hanging sleepily from the deeply-fissured persistent bark at the butt-end of the stem of the older trees, it being somewhat of the habit of Miss Eliza Cook's "Smuggler King," namely, it "takes its flight in the moonless night," and in the day it may be seen as before stated sticking about in corners, and if touched, it is so engrossed in its lethargy that it is next to an impossibility to awake it. On taking it down and examining its wings they are of a very strong ribbed nature, and when spread out measure from three to five inches from tip to tip. This insect sometimes gains admission into the limbs of old trees, and thoroughly perforates, by means of a continuation of roads or tunnels, a limb as large as one's body in a single season, and the consequence is, the branch falls with a crash that makes one think twice before taking shelter under one of these trees in a storm. There is another kind of moth that is found in the wattle or acacias, which by some mysterious way has been named *Eudoxylon eucalypti*, but it is never found in the Gum timber or Eucalyptus. The presence of this moth, or larva of same, at some time will account for the unexceptional occurrence of the root-end of red gum being burnt, as undoubtedly this little insect has eaten its way into the tree, and caused parts of it to die, and with the increase of green wood, or overgrowth, so the dead wood has increased, and with the custom of the aboriginals of setting fire to the grass in summer to facilitate their hunting operations, the dry wood has been annually burned out, and a fresh cause left for its further spread, as all the older trees bear more or less marks of it, and others are simply standing on legs as it were, of three or four in number, through which one may ride on horseback sitting erect, and some twenty feet above the tree is complete, and oftentimes of superior timber than a perfect solid stick, as the natural "gum wells," so detrimental to the red gum timber, are thus drained. Another cause to which this may be attributed is, the native of Australia has a particular taste for this larva, and he may be seen stealing his way among the young red gums, tomahawk in hand; he spies a hole, chops the bark, procures a small supple stick, inserts the end into the tunnel, gives it a twist of three or four revolutions, and draws out Master Grub with the stick through its entrails; whereon he takes it between his finger and thumb with its head facing him. It is then conveyed to his mouth, its horny head torn off and ejected, and with a backward toss of his head the worm disappears down his throat, and he again proceeds as before to capture another victim. This is considered by the aboriginal and occasionally by Europeans a great luxury. *Sua cuique voluptas.*

As we continue our walk up the creek we are met with a wilder and more romantic view, the hills on our right hand being capped with that stately tree, the *Eucalyptus corynocalyx,* whose love for the Wirrabara Forest and the ironstone formation on its more elevated parts is quite a feature, as when found in so short a distance from this it is a mere shrub or a scrubby tree. I have found it so far away as the Mount Brown Reserve, which is still on the Flinders range, but some eighty miles north of this, and even there it has a stunted appearance in comparison with that of this forest. Baron von Mueller describes it as follows, botanically:—"Leaves elongate-lanceolate, slightly curved upwards, very gradually narrowed, scantily or not perforated by oil-dots, with an oily lustre on both sides, somewhat *paler beneath;* veins numerous, moderately spreading, the two longitudinal veins often distinctly removed from the edge, umbels lateral or axillary, frequently crowded below the leaves, on almost cylindric stalks, bearing from four to sixteen flowers; stalklets shorter than the calyx, *lid hemispheric,* quite blunt or slightly pointed, much shorter than the bell-shaped cylindric tube of the calyx; stamens all fertile, acutely inflexed in bud; anthers almost oval, opening with longitudinal slits; style very short; stigma not dilated; *fruit urnshaped-ellipsoid; longitudinally streaked,* attenuated into a conspicuous stalklet, three-celled; its rim narrow-compressed; valves short, deeply enclosed; placental axis about three times as long as wide; seeds without any membranous appendage, the sterile seeds mostly rather broad." The Conservator of Forests of South Australia (Mr. J. E. Brown), in speaking of this tree, says "the wood has been known to last sixteen years as fencing posts and showed no signs of decay. The sweetish foliage attracts cattle and sheep, which browse on the lower branches of the tree, saplings, and seedlings, unlike what occurs with almost any other kind of Eucalypti The base of the stem enlarges into a wide expansion, forming almost a row of ascending little tiers." When in youth it has a pretty appearance, with small round leaves, stem quite red, and younger or topmost growth a perfect scarlet colour. It is most susceptible to injury from frost and cold, bleak draught, both in youth and maturity, especially if growing on a cold, damp site, where I have seen a patch of seedlings thoroughly destroyed by mildew and cold air;

and it is nothing out of the common to see a tree of 120 feet in height, with a diameter of stem at four feet from the ground of 6 or 7 feet, after a frosty night looking as "brown as a berry." It may be classed, as far as my experience goes, the most delicate timber tree of South Australia as regards injury from frost; but, on the other hand, it attains its greatest dimensions on a complete bed of rocks; in fact, I have seen it growing to perfection on a ridge of rocks or crag elevated some 100 feet, and this tree set in the centre completely rending the rocks asunder.

But to return, we have this tree here in sight with a gradually decreasing stem from the ground to its first branches, where it bursts forth in a complete shower of limbs, as if there were a demon among them, and they were rushing in every direction of upward tendency, clothed with its rich mantle of dark glazed leaves and intermingled with perfect bouquets of whitish-yellow flowers, which when seen from the distance have a charming effect, and its smooth yellow-barked stem contrasts admirably with its equally elevated neighbour, the *E. hemifolia,* with its silver-gray bark and complete showers of pink and white flowers, on a host of long, slender, drooping branchlets, some 1,500 feet above sea level, the crown of the hill being one bed of ironstone rock. Slightly below, we have a number of Banksias (honeysuckle), which are about 30 feet high with a stem of 10 feet, very crooked, intermixed with the Casuarina or she oak: the male tree is now in flower, which is literally covered with an orange or vermilion blossom, which contrasts nicely with the dark "cat's-tail" foliage, or equisetum development from joint to joint of the young shoots, which riding on the top of the older ones are suited by nature to serve as leaves which become woody after their production of younger organs. South Australia can boast of a tree of the forlorn ages, and a representative of the plant that once filled prominently the thickets of those primitive forests in the first period, and afterwards deep beds with their remnants which our miners bring again to light in the way of coal to-day. The she oaks have, as far as concerns their development and the exterior of their younger organs, maintained their character, that is to say, the equisetum shape. Still, on the face of this hill and mixed with others are the drooping variety of *E. leucoxylon* which I described in my former letter, with its long rolls of scarlet flowers, branches sweeping ground, and in places overhung by the huge forms of the *E. rostrata,* on reaching which we catch a sight of the forest nursery, with its basin-like form, and closed in with sloping banks on the north of sandy loam, south of limestone, west of a sandy loam and the nurseryman's house, stables, sheds, &c. Laying out in front the alluvial plat of vegetable mould is the ground used

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as a nursery, intersected with a number of broad white (limestone) walks, perfectly hard, which combined with the *black* soil and the lively green of the young exotic plants presents rather a pleasant picture to a scene confined to not more than six acres. On the northern and south banks and west are planted specimen trees, the alluvial deposit *only* used for nursery operations. Among these specimen plants we noticed doing exceedingly well, *Fraxinus Americana*, *F. excelsior*, *Pinus halepensis*, *P. insignis*, *P. Canariensis*, all very young, but looking remarkably well, and also walnuts planted seed three years ago, now fifteen feet in height. In the nursery beds we noticed *Catalpa bignonioides* seed planted this year, and plants from same from 4 ft. to 7 ft. in height, and fine sturdy plants; American ash, from cuttings, this year's laying, from 3 ft. to 8 ft. high, also the picture of health; English ash (*F. excelsior*) from cuttings laid this year, 6 ft. and 7 ft. high; *F. Americana*, from seed this year, 4 ft. high on the average; *Quercus pedunculata*, 3 years old (about), 1 ft. to 14 in. high, quite a failure; *Pinus insignis*, looking remarkably well, some 16 in. high, from seed this year, and those transplanted or bedded out from last year's plants, some 2 ft. high; in fact, the whole of the plants are looking in every sense well; about 20 varieties of Eucalyptus also of same extraordinary growth.

We are now again about to cross the bridge and retire from this excellently-kept nursery. After a walk of half a mile we again mount our faithful steeds, and under an impression that the shades of night are about to close over us we indulge in a whiff of the noble tobacco leaf rolled up and dried, and before its last breath is drawn and its dust drops away we are at home in the temporary abode of

TAM O'SHANTER.

*South Australia, May*, 1880.

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LARGE ELM TREES.—The Hartford *Times* says that in Deerfield, Mass., the Williams elm measures in circumference at one foot from the ground 26 ft.; at four feet, 19 ft.; at seven feet, 20½ ft. Another elm measures, at the same elevations, 27, 18½, and 19 ft. Another measures 22½, 15½, and 13½ ft. This last-named tree has a spread of 100 ft. The Williams elm measured in its spread at least 150 ft. At Westchesterfield, Conn., there is an elm which measures, at three feet and three inches from the ground, 22 ft. 5 in. The girth of this tree where the roots enter the ground is 55 ft. 6 in. Thus the circumference of the south branch is 16 ft. 8 in.; of the east branch 11 ft.; of the north 11 ft.; north-west, 11 ft. 3 in.; of the west, 8 ft. 7 in. From north to south the diameter of the spread is 150 ft.; from east to west 152 feet, and the circumference of the spread is 429 ft.

# Wood-working Machinery for Estate Purposes.

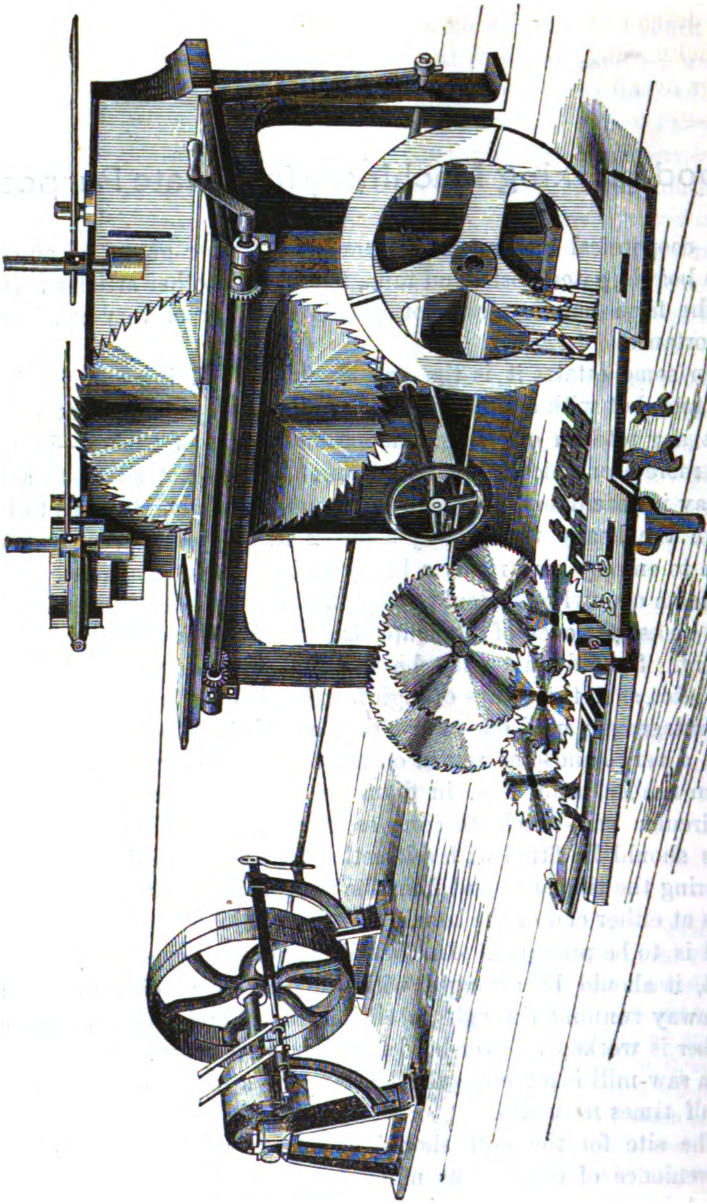
The economical and rapid conversion of timber grown on an estate into boards, gates, posts, and rails, fencing and other articles required in the farm buildings and cottages, is a matter of very considerable importance.

On some estates it is the custom to let building and repairs by contract, but with a little judicious outlay and management this can —at any rate on estates growing a sufficiency of timber—be better and more economically done at home. We do not advocate a large outlay in machinery, as it will be found more advantageous to break down the heavy timber, say about 2 ft. in diameter, on a sawpit, than to employ very rarely a heavy and expensive machine.

Steam can, without doubt, be profitably employed in wood conversion on estates even of moderate size, say above one thousand acres in extent. Should an engine be used for thrashing, preparing cattle-food, &c., as in these days of high farming is usually the case, it can be advantageously used one or two days a week in wood-cutting, and will give a very handsome return on the outlay necessary. For breaking down timber below 2 ft. in diameter, we can recommend the use of a circular saw-bench to carry saws up to, say 48 in. in diameter. This should be fitted with self-acting feed-gear, and timber carriages, to bring the timber to and from the saw, should be arranged to run on rails at either end of the bench. For rough jobbing work a drag-rope feed is to be preferred. If a building is erected especially for a saw-mill, it should be arranged with large doors at either end, and a tramway running through its entire length, and where much heavy timber is worked an over-head traveller is necessary. The best shape for a saw-mill is a rectangular building, of a length of about two and a half times its width.

The site for the mill should be chosen with an especial eye to convenience of carriage, as much money is often wasted from buildings being inconveniently situated for drawing the timber in and out.

The great majority of estates are, however, of not sufficient extent, or do not grow sufficient timber to make the erection of a complete mill necessary: in these cases it is advisable to erect a machine which is capable, with certain alterations, of performing a considerable range of work. Our illustration represents such a machine; it is entitled the "Estate Carpenter and Joiner," and is from the designs of Messrs. M. Powis Bale and Co., Wood-working Engineers, 20, Budge Row, London, E.C.



THE "ESTATE" CARPENTER AND JOINER."

It is of the simplest possible construction, all the operations being worked from one spindle, and is capable of performing all the sawing, and carpentering, and joinery work usually required on an estate of moderate dimensions.

It is designed for all kinds of sawing up to 14½ in. deep; planing and thicknessing up to 9 in. wide at one cut; mould and dress skirtings over 13 in. wide; cuts tenons and shoulders without setting out, rebate, tongue, groove, mitre; in fact, do nearly every operation required in joinery (except putting together and cleaning off) with great rapidity and perfection not only unattainable by hand, but equal in point of quality to that of separate machines.

For cutting feather-edged or bevelled boards a small angling fence is employed; this is attached to the long fence which is used for planing, and is easily removed. The long fence can also be used for cross-cutting door stuff, fencing, firewood, &c. By means of a slot mortising-table, not shown in the drawing, all kinds of fencing gates, &c., can be morticed and bored, the depths and lengths of the mortices being regulated by stop-pieces fitted to the table. A sliding plate, working in a dove-tail groove in the top of the bench, can be used where accurate cross-cutting is required, such as in door-stiles, wood-blocks for paving purposes, &c. Tenons are cut by means of two circular saws, the wood being cramped vertically in a slide and passed between them. For rebating, tonguing, grooving, &c., thick saws, which are allowed to project above the table, are employed, any depth of groove being obtainable by raising or lowering the saw-spindle, the wood being passed over the top of the saw. For preparing or thicknessing door stuff a planing disc is put on the spindle in lieu of the saw, the wood being passed between it and the saw-guide or fence. Moulding is performed by the use of a moulding block, which is easily fixed on or removed from the saw-spindle.

The machine is so simple that a farm labourer, with a little practice and supervision, is soon enabled to turn out a large amount of satisfactory work.

Where much timber is grown a band sawing-machine can be employed with great advantage in preparing wheel felloes, break blocks, shafts, brush backs, &c., which will find a ready market in the large towns; the waste wood can be used for firewood, and a considerable freightage is saved by sending the wood to market already prepared instead of in the rough.

Where machinery is employed it is advisable to put it solely in the charge of one man, who is answerable for its condition, the condition of the saws, &c.

In economically working sawing machinery a point of great importance is the proper selection and sharpening of the saws and cutting tools; but how often do we see saws of the wrong-shaped teeth for the wood to be sawn used, or saws badly sharpened or left with scarcely any gullet; the result being a smaller quantity of badly finished work, for the turning out of which much more power than is necessary has been used. In cutting or ripping soft woods, such as pine with the grain of the wood, the teeth of the saw should be set further apart, and the pitch or rath and "set" of the teeth should be considerably coarser than for hard wood. If a line is drawn through the points of the teeth, the angle formed by the face of the tooth with this line should be, for cutting soft woods, about 65 degrees to 70 degrees, and for cutting hard woods about 80 degrees to 85 degrees. The angle formed by the face and top of the tooth should be about 45 degrees to 50 degrees for soft wood, and 65 degrees to 70 degrees for hard. These angles, however, must be modified according to circumstances. In sawing resinous woods, such as pitch pine, the teeth of the saw should have a considerably coarser "set" and space than for hard woods. For sappy woods saws with longer and sharper teeth should be used.

Before sharpening a circular saw it should be made perfectly round. This can best be done by placing the saw on the spindle, and running down the points of the teeth by means of a hard piece of stone. It is important that the cutting angles, and the tops and faces of the teeth should be bevelled exactly alike; the gullets, too, should be of even depth, as the saw will work more freely and with less power than if the teeth are allowed to get short and stumpy.

To work circular saws successfully, in addition to the shape of the teeth, much depends on the "packing," which should be fitted evenly on each side of the front half of the saw, so that the friction and consequent expansion and contraction of the saw-blade may be perfectly uniform. If this is not the case it will run out of truth and turn out inferior work. Saws stand to their work better if set with a blow than if bent.

The teeth of saws for cross-cutting purposes must be made more upright than for cutting with the grain, and more acute or lancet-shaped in their form. The faces of the teeth should be sharpened to a keen edge, and for hard wood filed well back, so that in work they have a direct cutting action, similar to a number of knives. The teeth should also be made of sufficient depth to afford a free clearance for the saw-dust.

Belts used for driving circular saws should be of ample width, say not less than one-fifth the diameter of the saw, and should never run at short centres. If a saw-bench is driven direct from the fly-wheel of an engine, it should be placed at a distance of not less than twenty-five feet from the centre of the crank-shaft to the centre of the saw-bench driving pulley.

Occasionally the bearings of the saw-bench spindle or crank-shaft of the engine may get warm; we can, as a lubricant, recommend the use of tallow mixed with plumbago powdered very fine. This not only retains the lubricating properties of the tallow, but produces a smoother surface on the bearing, and therefore lessnes the friction and power required to drive.

## THE CORK TREE FOR COLONIAL CULTIVATION.

Among the various economic plants recommended by Baron Ferdinand Von Mueller for naturalization in Australia, says the *Colonies and India*, one of the most important is the Cork Oak, a native of Southern Europe and Northern Africa, where two or three varieties, producing cork-bark of different qualities, are met with. Notwithstanding the increasing demand for the produce of this tree, very little attention has hitherto been paid to its cultivation. Spain, Portugal, France, and Italy are the principal sources of the supply of cork; but even in these countries the principal aim has been to strip as much of the bark as possible from the trees, and leave its reproduction and the multiplication of the trees themselves to nature. All the Cork Oaks are evergreen. The first crop of bark may be taken when they are about twenty years old, though it is most advisable to delay the first stripping of the tree till it is double that age. The operation may be repeated afterwards at intervals of not less than seven or eight years. The tree, though resisting a considerable degree of cold, thrives best in a temperate climate, and will grow at great altitudes with a southern aspect. The soil best suited for its growth is of a slaty or silicious nature. Some experimental plantations on a small scale in Victoria proved that the young saplings grow at the rate of four feet a year. There are many districts in different parts of Australia, India, New Zealand, and South Africa, where this majestic tree would thrive, and where, with proper cultivation, it would prove a great source of wealth. The demand for cork in all branches of the mechanical and industrial arts is largely increasing, and, except for recent precautionary measures taken for the preservation of the plantations in Spain, France, and Algeria, would considerably outrun the supply. If only for their own needs, and without any view to an export trade, our sub-tropical colonies should turn their attention to the production of cork.

**The Blue Gum Tree.**—A gentleman at Santa Barbara, Cal., recently cut down a blue gum tree on his grounds that was planted seven years ago. It was 78 feet high and measured 6 feet in circumference at the butt. When planted it was a slender shrub about 3 feet high, and now it will cut up into at least a cord and a half of stove wood. The growth during the seven years was 75 feet, or 10$\frac{5}{7}$ feet a year.

# The Training of our Indian Foresters.

By G. S. BOULGER, F.R.S., F.L.S., Hist. Nat. Prof.

The acquisition of that fever-stricken white elephant Cyprus, and the marked deterioration of the climate of Mauritius until replanting was commenced, have opened the eyes of the English statesman to the importance of trees. Plants and climates cannot rapidly make themselves heard, and it would seem that when their grievances are recognised circumlocution offices are the first to rush to the rescue and do those things they ought not to do.

India presents a vast area of rich soils which are not made the most of—a climate that produces luxuriant plant-growth, and forests that may everywhere be sources of considerable revenue; though while in some places it may be advisable to sustain them by only partial felling, or even by replanting, in others it may be better to clear them altogether. These forests consist of trees belonging to families totally distinct from those familiar to the European arboriculturist. They live under a climate as different from that of Europe as a cabbage from a custard apple. They have been neglected for ages, and there is no existing system of treatment that can be appealed to as a model for their management. Finally, they are on such a scale that they must be considered from the more wholesale point of view of Continental sylvicolture rather than from that of our more detailed insular arboriculture.

If the importance and difficulties of the subject be conceded, it cannot be denied that we require able men to grapple with it, and that the Indian Forest Service is one which it is but short-sighted economy of the "penny wise and pound foolish" order to stint either in men or money. We want able men, and we must have enough of them to do the work well. If sufficiently paid, I believe these men are to be had, but the question remains how to get them.

It may, perhaps, be plausibly maintained that, like the poet of our Latin syntax, a forester is born, not made. We can hardly, however, suppose that any one would carry the doctrine of special creation so far as to say that an Indian forester is predestined from the cradle. A very opposite opinion prevailed not long since in the august University of Cambridge, when it was held that a really able man, say a Fellow of Trinity, might turn his hand, or at least his head, to anything, so that a good mathematician would make an excellent professor of chemistry, or, perhaps, theology; no hole could be too square for the roundest of them. With such an instance before us as that of Clive, we may, perhaps, safely say that, while we must take all the care we can in picking our men, very much will depend on their training.

How, then, does our Government at present select its Indian foresters? What class of men does it get? How does it train them, and what reforms can be suggested? These are the subjects of my present article. The India Office hands the matter over to the Civil Service Commission, as respectable and conservative a red-tape office as any within sound of Big Ben. They have, of course, one nostrum. They advertise a competitive examination, open to any young men between certain limits of age. On applying for further particulars would-be candidates learn that they must produce certificates of conduct and health; pass a certain standard in colloquial French, mathematics, and the rudiments of some two sciences; get sufficient marks to be among the first six candidates; undergo a medical examination; be capable of walking twenty miles; be able to ride; and lastly, pass two years in training at Nancy, to a considerable extent at their own expense.

The literary examination and the expensive after training virtually exclude the home-trained sons of foresters. The limits of age exclude university men, or men who could have had experience in woodland or other cultivation. The physical examination excludes the sickly bookworm that popular superstition believes to be the sole and necessary result of the so-called "cramming" system. Most of the candidates are gentlemen, sons of officers, clergy, merchants or professional men, of the same social standing as a class as the candidates for the India Civil Service. Most of them have received some education at a public school, or at one of those "colleges" that give as good a training at a somewhat less cost. The head masters of these schools are university men of middle age, bred in traditions such as those before alluded to. The highest honour to which they wish their senior boys to aspire is a university scholarship, and they would rather this were obtained in the orthodox classics or mathematics. English is taught neither at our schools or at our universities, and science is looked upon with suspicion at the latter, and therefore is necessarily treated as a very subordinate matter at the former. Accordingly on leaving school a boy may be able to translate Latin prose at sight, write a fair rendering of English into Latin, and a better specimen of sapphics or elegiacs, to translate a Greek author he has previously read, and produce iambics of metrical perfection; he may know his Euclid, algebra, and some trigonometry, with even a little conic sections, and may have worked through Newth's Natural Philosophy so as to reach the standard of the London University

Matriculation, or in exceptional cases the first B.A. Examination; finally, he may be able to read French or German, or even both, and may even have "been through" Oliver's Elementary Botany, or the inorganic portion of Roscoe's Chemistry. If the boy shines in an orthodox direction, and the paternal purse is long enough, he may be sent for a three years' jollification at Oxford or Cambridge, with no very definite ulterior aim, and may then find himself a poor curate, a schoolmaster, or a briefless barrister. A lad who can pass the London first B.A. is almost certain of a scholarship at Oxford or Cambridge. The provident parent, however, will consider his son's future before he leaves school. There are well-paid appointments open to all young men under twenty-five in our Civil Service at home. These are mainly taken by young graduates, who supplement their university training with a year at a London "crammer's." The India Civil Service is not what it was in many ways, possibly not so aristocratic; certainly not so easy a means of making a fortune. Still the salary sounds big in rupees, and Paterfamilias would even part with the hope of the family and undergo the expense entailed by the now virtually obligatory two years at the university. Accordingly, when the lad is sixteen, before he can have any fixed character or tastes, save one for boating, cricket, football, or an illicit weed, a crammer is consulted. When fifteen out of twenty-seven of the successful candidates come from one establishment, I can hardly be accused of advertising Messrs. Wren and Gurney when I say that about half the candidates for these examinations come to them. If the lad has brains and a liking for an outdoor life, and imagines he will like India, the father may naturally prefer his entering a service in which he can even save money to supporting him in the ornamental idleness of the army. India it is to be, and it rests between the "Civil," "Cooper's Hill," and the "Forests." "Fly high," suggests the parent; and so, unless the crammer sees from the first that it is hopeless, the lad enters the competition for the India Civil Service. With a smattering of several subjects it matters little to him in what subjects he is to be re-grounded. English he knows nothing of, and very possibly he has taken a long vacation on leaving school, in which other subjects have grown more than rusty. He is recommended to make classics or mathematics his strong point, and perhaps takes a modern language as an easy way of adding on a few marks. After six or eighteen months the examination takes place, and if he finds himself among the first hundred the candidate is encouraged to try again. If not, he often turns to one of the other services. The Civil Service examinations take place in the early summer; those for the Forests in December or January. After a long vacation, say in September or even October, candidates often come to me announcing their intention of "going in" in January. They are either unsuccessful candidates for the India Civil, or know that they would have no chance in that examination. They intend to "take in" four sciences, and are required "to be proficient" in two. And *this in four months!* Those who will have any chance have probably been abroad during the summer to brush up the necessary French. If they have ever learnt any science, they have been carefully forgetting it while taking up other subjects; and they are almost certain not to know a spruce from a larch, or a loam from a marl, nor to have seen a theodolite before the one or two meagre practical lessons it is possible to give them in London. The successful ones in science are not those who know most, for they can hardly be said to *know* anything; but simply those who, perhaps from a fortunate natural impenetrability, have been unable to take in enough to get their brains as completely muddled as the rest. They know a little inorganic chemistry and natural philosophy, the external anatomy of flowering plants, seldom including the more difficult, though most necessary trees and grasses, and a little geology, including a few minerals and fossils, but hardly any practical knowledge of soils. The India Office has the valuable assistance of a real Indian forester in the person of Dr. Cleghorn; but it is difficult to see what good even he can be in a system so radically wrong. A considerable proportion of the candidates are annually rejected on account of an insufficiently colloquial knowledge of French, and another considerable proportion on account of such physical defects as bad eyesight, heart disease, or varicose veins.

Having then got the men, the Government despatches them to Nancy, where after spending some little time in becoming familiar with the language, and learning the rudiments of sciences, they undoubtedly have time to become acquainted with the French method of sylviculture. Before going to India they may attempt in two months to pick the brains of a Scotch forester, or in a similar length of time to muddle themselves by grafting a few German notions, picked up in the Hartz, on to their French stock of ideas.

Arrived in India they have new languages to acquire, and an unknown flora around them. They are at once set to work, having, perhaps, almost unlimited control over a large forest area, or being under a superior officer imbued with entirely German ideas of sylviculture. We have not as yet developed an Indian system of forestry, though no one can fail to recognise the impossibility of transplanting any one European method wholesale.

Such being the state of the case, what fault have we to find, and what remedy to suggest? Firstly, we should expect better things of men who became foresters by choice, not as a *pis-aller*. In order to get this class of men, the cost of the subsequent training and the difficulty of the entrance examination must be diminished. The three R's, and a little practical knowledge of soils, trees, and botany might be required from candidates for admission to a British school of forestry, located at Edinburgh, under such a man as Dr. Cleghorn, or Dr. Croumbie Brown. The curriculum here should be free, and should include, besides practical forestry, training in mathematics, engineering, surveying, bookkeeping, geology, zoology, botany, and facilities for acquiring French and German. Such a course might be cheaply obtained by affiliation with the University of Edinburgh. It should extend over two years, after which the candidates should be drafted in order of merit, *as determined by the staff*, for general industry, progress, and proficiency, to a similar college at Seharanpûr, or elsewhere in the hills. Here they might acquire native languages and Indian forestry practically during a third year's training, before receiving any post of trust.

I am convinced that were the service enlarged, and the training conducted on the plan I have here only indicated in outline, the results would be more satisfactory, and the cost certainly less per man. We should not then be dependent on Nancy; our foresters would not become wedded to a doubtfully well-founded theory, and we should attract to the service the sons of our foresters, farmers, &c., at home, instead of the present somewhat unsuccessful class of quidnuncs.

I feel it to be useless to write more in detail until the main principle for which we contend is conceded by the establishment of a British school of forestry.

LIGHTNING AND TREES.—Professor Colladon, of Geneva, has made some interesting observations on the course of lightning when it strikes trees and houses. He holds that the great discharges which injure trees and houses seldom or never happen while the lightning has an unobstructed course—which it has along the thin upper branches of trees, where birds and their nests are often left quite uninjured by its descent. But it is where the electric current reaches the thick stem that the tree becomes a worse and worse conductor, and it is here, therefore, that the tree is what is called struck—*i.e.*, here that the electricity, failing to find an unobstructed channel to the earth, accumulates in masses, and gives out shocks that rend the tree. And the same is true of houses whose lightning conductors stop short of the ground. Professor Colladon has also shown that the close neighbourhood of a pool of water is a great attraction to the electric current, and that the electricity often passes down a house or till it is near enough to dart straight across to the water; and he thinks that where possible lightning conductors should end in a spring or pool of water. Professor Colladon believes that lightning descends rather in a shower—through a multitude of vines, for instance, in the same vineyard—than in a single main stream. It divides itself among all the upper branches of a tree, and is received from hundreds of atmospheric points at once, instead of, as has been usually supposed, from one. Electricity is a rain, a number of tributaries from a wide surface, not a single torrent.

# Scottish Arboricultural Society.

## SUMMER EXCURSION.

A SUMMER excursion to some of the more notable woods and plantations of Scotland has now come to be regarded as one of the standard items on the programme of the Scottish Arboricultural Society. The idea so happily conceived by Mr. Saddler, erstwhile the genial secretary of the society, and now the curator of the Edinburgh Botanic Gardens, has, in its repeated realization, been productive of much unalloyed pleasure to the participants in excursions far more varied than Wordsworth ever enjoyed. The excursions have likewise afforded a vast amount of instruction to many of the members, and in many respects the science of arboriculture has been advanced by the collation and publication of many useful and interesting facts regarding forests and forest management. While we do not under-estimate the importance of the October meetings, when, in the class-rooms of the Botanic Gardens, papers are read and discussed on many subjects germane to tree culture, we think that the true method of demonstrating the facts and theories of arboriculture is by intelligent study in the woods and plantations themselves. Arboriculture is in this respect on all-fours with another experimental science, viz., that of medicine. Little progress could have been made in medicine had discussions been confined to abstract theories in the class-room, conducted even by the most learned and eloquent of professors. Improvement in the science was only possible by clinical observation in the hospital. The arboriculturist's field of clinical study is the forest, the wood, the plantation. Each member becomes there a professor, all the others are willing in turn to listen to his prelections.

It was with some such feelings that the members of the Scottish Arboricultural Society embarked on the morning of Thursday, 5th August, upon their third annual excursion. The excursion committee had arranged a regular round to be accomplished in two days, and although some of the members suggested that perhaps too much had been attempted in the programme, why it surely were better thus to find an *embarras de richesses* than suffer arboricultural starvation.

The rendezvous was the West Princes Street Station of the Caledonian Railway, the hour seven o'clock; and at the stated time and place a goodly company assembled on the platform and embarked in the reserved carriages. Some well-known faces were missed, but intimation was given by the new secretary of the society, Mr. John McLaren, jun., that a number of members found it more convenient to travel *via* the North British line. During the run out to Carstairs, where a change of carriages was necessary in order to go down the Dolphinton branch, true to professional instincts and the objects of the "outing," conversation was directed to the thriving character of the many plantations which are rising up on either side of the line, more especially between Cobbinshaw Loch and Carstairs, and converting bleak, barren moorland into diversified woodlands, due to the enterprising spirit of Sir Simon M. Lockhart, Bart.

Passing notice was taken of the grand woods surrounding Riccarton, seen on the right—the estate of Sir James Gibson Craig, Bart.—in which the father of the present baronet had planted many acres with the best of the North American Coniferæ; while onwards a peep was obtained of the fine old woods around Hatton House, the ancient seat of the Earls of Lauderdale, and now the property of the Earl of Morton. Incidentally a remark was made that in the neighbourhood of Edinburgh the Lombardy Poplar was leafless this year; a member of the company stated that within ten minutes' walk from his house he could count over a hundred large and handsome trees to all appearance dead. Mr. Gorrie said that it was owing to the frost of last winter, but that the trees would revive next year. He remembered the same thing happening some six or seven years ago. It was a pity to see some of the fine old trees being cut down by ignorant people, thus denuding Edinburgh of its too few arboricultural ornaments.

The country around Carstairs, which in the memory of even the youngest of the party was bleak moorland and is now assuming the most beautifully wooded aspect, naturally turned the discussion to the benefits which judicious planting may confer not only upon the proprietor of the estate, but upon the tenants and on the whole population of the district. Our first objective point was Dolphinton, the property of John Ord Mackenzie, Esq., W.S., a manor which exhibits this feature in what we would call the mission of arboriculture, to a degree which is not surpassed, if indeed equalled, by any other estate in the south of Scotland. While the train is speeding onwards towards Dolphinton, therefore, it may be well to glance at what the estate was, at what it is, and how the metamorphosis has been accomplished.

In the beginning of the present century a writer, referring to this part of the county of Lanark—for Dolphinton is on the borders of Clydesdale and Tweeddale—said that "it was mountainous, or at least hilly and marshy, and from the nature of the soil and the great elevation, not capable of any agricultural improvement." In the whole of the Upper Ward of Lanarkshire in the first decade of the nineteenth century there were only 3,000 acres under natural coppice and plantations, the chief trees in the plantations being Scots fir and larch. What is now the most charming part of the year, namely, the autumn, on these uplands, with a dry bracing air which sends the blood coursing with new vigour and life through the frame enervated by the wear and tear of city life, and with the eye regaled by the varying tints of the woods and the flickering shadows on the green hill-sides, was three-quarters of a century ago a very different scene. Then the thin and scanty crops often suffered in consequence of the hoar frosts or frosty mists which occurred not only in the autumn but towards the end of summer. Even in August the weather was extremely apt to change from rain to frost. The highest land was always the last to suffer from this kind of frost; the lowest was scourged by it. A low, white, thick creeping vapour arose after sunset from the running and low-lying mosses which gradually spread to a considerable distance, and to a certain height over the land in the neighbourhood. These frost-mists attracted each other, and wherever they rested they destroyed vegetation. Last autumn we observed exactly the same process and the same destruction going on in the districts of Friesland and Oldenburg in North Germany, where the land is unprotected by woods, and remains undrained. In Lanarkshire the frosts and frost-mists were due to the fact that the moss-plants which formerly covered the surface of the ground, retained the moisture with wonderful obstinacy; and as evaporation is one of the most powerful means by which cold is generated, whole tracts of the country were exposed to a sinking temperature. Again, it is a known meteorological fact that cold flows downhill exactly as water does, although it is readily arrested by any obstruction, such, for instance, as a net, or plantations, which are just nets on a large natural scale. In the district of country under review the draining of the mosses has done much to ameliorate the cold, but much more has been done by the planting of trees in flowing bands or in clumps. Ridges have been nicely covered with plantations which stretch down the sides of the valleys in waving lines, as pleasing to the eye as they are admirably adapted for catching the cold as it glides down towards the reclaimed lowlands. The bottoms and slopes are thus protected from the inroads of the cold and blighting mists, and the crops are permitted to ripen; while the shelter from the blasting winds afforded by the plantations has likewise had its effect upon the climate of the whole country side.

As we have said, Dolphinton seventy or eighty years ago was very nearly a barren waste. Mr. Mackenzie's father began the process of reclamation and improvement, and when the present owner succeeded to the estate, which comprises about 3,000 acres, he continued the good work inaugurated by his predecessor. A large part of the estate is upwards of 800 feet above the level of the sea, but so judiciously has the planting been executed, and so admirably have the woods been disposed for shelter, that the climate has been materially meliorated. We believe that the arable land on the estate, forty or fifty years ago, yielded a very insignificant rent per acre, whereas now the rent readily given for the nicely sheltered farms is largely increased, while there remains to be accounted for the profit arising from the woods. Mr. Mackenzie has done a great deal in the way of introducing the newer Coniferæ, and notwithstanding the high altitude of his estate, these have done remarkably well—much better indeed than in lower situations. But of this more anon.

Dolphinton Station was reached at a quarter past nine, and the members of the society were warmly greeted by Mr. Mackenzie. A move was at once made for the carriages in waiting, and the party being seated they set out on their short drive to the Mansion House of Dolphinton. *En route* there was a heavy shower, but it in no way damped the spirits of the party, who only saw in the driving rain a new feature of beauty in the charming landscape of hill and dale and spreading wood. On entering the policies attention was at once directed to the carefully tended timber, young and old trees alike speaking in plain language a master's loving care. In a few minutes a hospitable welcome was accorded the party by the proprietor, and the short interval of waiting for the remainder of the excursionists, who had travelled by the North British line, was happily spent in admiring the exquisite view of park, lawn, and forest-clad hill from the drawing-room windows, or in that all-absorbing topic—weather prognostication. Then the way was shown to the quaint wainscoted dining-room, and the members were entertained and thoroughly fortified for a long day in the woods by an abundant and welcome breakfast. Of course mine host presided, and among those present were Sheriff Gloag, Messrs. R. Hutchison, of Carlowrie; Wm. McCorquodale, Scone; Malcolm Dunn, Dalkeith; Chas. S. France, Penicuik; W. Rayson, Royal Exotic Nurseries, Chelsea; J. Methven, of T. Methven & Sons, Edinburgh; Wm. Gorrie, Rait Lodge, Trinity; Wm. Stewart, Dalhousie; James Alexander, of Dickson's and Co., Edinburgh; R. T. Mackintosh, Edinburgh; E. Dixon, Edinburgh; Wm. Thomson, Clovenford, Galashiels; J. McLaren, Hopetoun; John Lamont, Glen Nursery, Musselburgh; James Kay, Mount Stuart, Bute; A. McKinnon, Melville Castle; E. Sang, Kirkcaldy; W. Kinnaird Rose, Edinburgh; and Mr. J. McLaren, jun., secretary of the society.

By the time breakfast was over, and the guests had inscribed their names in Mr. Mackenzie's album as a souvenir of the visit, the weather had cleared up, and although some trailing clouds yet hung low over the distant hills, the weather-wise members of the company predicted a clear, warm day—a prophecy happily realized. A start was at once made under the leadership of Mr. Mackenzie for an inspection of the woods. And first of all a noble *Araucaria imbricata* was pointed out near the drawing-room window at a height of 834 feet above the level of the sea, though it is to be noted that the tree is sheltered from the north-east by the mansion house. Passing through the well-kept and attractive gardens, a *Wellingtonia* about 30 ft. high was found flourishing in the lee of the garden wall. A short time was spent in examining various plants of much interest, growing freely at this high altitude, and leaving the garden we turn to the left, and pursuing a winding foot-path find ourselves in a mixed wood where the strange freaks of lightning upon trees are vividly realized. The victim is a silver fir, 51 years old, and it had attained a height of 60 ft. The storm during which it was struck occurred on 6th July last, about eight o'clock in the evening. Two flashes were observed almost simultaneously, followed on the instant by a deafening peal of thunder, which rolled along the valley towards the opposing wooded heights with many sharp reverberations. One of the flashes melted the iron wire of a fence near the home policies. The other appeared to have struck the silver fir about 35 ft. from the base, cut the top clean off and thrown it for some distance, where it stood in an upright position. Then the fluid shivered to pieces about 15 ft. of the middle of the stem, and tore off two large limbs—one being sent eastwards and the other west. The lower trunk, 20 ft. in length, was next split right down to the bottom, one large splinter being driven clean away, while the remainder of the stem remained stationary with the bark partly stripped off. A general desire was expressed that this wonderful wreck should be photographed. Passing onwards to the North park we find some beautiful *Abies Menziesii*, one stalwart tree measuring 3 ft. 6 in. in girth at 5 ft. from the ground, and rising 49 ft. 1 in. in height; while a second is 40 ft. 6 in. high. Turning to the Belmont Plantation we pass several Spanish chestnuts, which seem to be making slow progress, and a group of very healthy *Picea cephalonica*, whose progenitors had possibly listened on Grecian slopes to the fabled notes of Orpheus' lyre. Then we come upon the gems of Dolphinton—the *Abies Douglasii*. One specimen of this graceful conifer measured 6 ft. 6 in. at its base, 6 ft. 1½ in. 3 ft. up, and 5 ft. 4 in. at 5 ft. from the ground, with a total height of 55 ft. 10 in. Other specimens in the same clump rose to a height of 52 ft. 5 in., 48 ft. 1 in. and 51 ft. *Abies Albertiana* appears to thrive remarkably well, and we pass specimens 29 ft. 3 in. and 28 ft. high. As we continue our peregrinations towards the pond we pass the *Douglasii* Walk with its grand row of trees of that species; a very fine specimen of the Service tree, *Pyrus sorbus;* note the very glaucous foliage of a large sample of *Cupressus Lawsoniana glauca;* promising and beautiful specimens of *P. lasiocarpa* and of *Abies Pichta*, which latter Mr. Mackenzie maintains the rabbits won't touch. Now we come upon a group of *Picea nobilis*, one of which rises 42 ft., and the rich dark-green foliage shows the admirable adaptability of the species to the district and situation. Here too we find *P. Nordmanniana* attaining a height of 34 ft. 3 in.; a noble plant of *Abies orientalis* 18 ft. high; and a *Picea grandis* which has made 4 ft. of growth for four years in succession. Mr. Mackenzie has wisely, for the sake of this grand tree, removed two large elms so as to give it more light and air—it being now 36 ft. 1 in. in height. Near the prettily situated pond there is a small collection of *P. grandis*, which Mr. Mackenzie raised from seed received by him as a contribution from the Oregon Expedition. The pond affords a sweet bit of landscape. A clear hill-brook runs into it, and its winding banks have been tastefully furnished with American plants, sedges, rhododendrons, willows, silver poplars, ferns, and foxgloves, each one of which tells with the most admirable effect in the foreground, while the rising ground to the left and partially to the right is clothed in stately beeches, oaks, and other hard-wooded trees. On the north side the view is magnificent, commanding a varied stretch of wood and grass with a peep in the far distance of the blue hills of the Upper Ward of Lanarkshire, and of Peeblesshire. A notable feature in an opening at the foot of the pond is a spruce fir which raises its straight stem and feathered limbs almost in the centre of the opening, and affords a lovely setting and perspective aid to the picture. As we pursue the winding walks up the little glen we come upon *Abies Hookerii* 8 ft. high and very much at home; *Pinus strobus* touched with frost, *Abies Pattoniana* 14 ft. high and very glaucous. Mr. Mackenzie informs the company that the larch in this small plantation has wholly died out. Reaching the upper walk we find a weeping variety of *Abies Albertiana*—very silvery and extremely graceful, and adding quite a charm to the otherwise exquisite glade. Now we come upon a plantation fifty years of age in which we find Scots fir rising in height to from 55 ft. to 60 ft. and containing about twenty cubic feet of timber, clean and straight in the bole and of excellent quality; an *Abies excelsa* about 80 ft. high and 7 ft. in girth at 5 ft. from the ground. Oaks are numerous here, but they are suffering from the depredations of a little moth, probably *Yponomeuta querci*, which was very prevalent in July. It deposits its eggs between the skin of the leaves; these hatch a yellowish red grub, which commits sad havoc upon the leaves, and these soon after dry up and fall. Here is also *Pinus monticola*, a Mexican pine about 50 ft. high, but which to all appearance is past its best. Among the company opinion is divided as to whether this result is owing to the effects of frost or to the ravages of *Hylurgus piniperda*—a black beetle which bores its way into and then tunnels up the pith. There is this to be said in favour of the believers in frost, that on dissection of a large number of shoots no evidence can be found of the beetle's tunnelling propensities. In our circumambulation we have now reached the West Gate, which is surrounded with many fine young conifers and other choice trees, and hosts of the best sorts of rhododendrons, giving promise in their thickly-set buds of a wealth of bloom next year which should make up for the deficiency of flower this summer. Just outside the gate is a magnificent view along the bosom of a richly-wooded valley dotted with thriving homesteads, bright with green and golden fields stretching up the slopes of the Broomielaw, a hill where five parishes meet; and amid such a scene there was a disposition to pardon a fervid Horatian in the company who burst forth:

> "Hic tibi copia
> Manabit ad plenum benigno
> Ruris honorum opulenta cornŭ."
>
> "Here plenty rich with rural honours shall flow to you,
> With her generous horn filled to the brim."

Retracing our steps within the West Gate, we turned to the right, down a path which skirted a rising plantation of various species of conifers till we reached the ancient churchyard of Dolphinton, which contains the remains of Major Learmont, one of the heroes of the Covenant, the ter-centenary of the signing of which was celebrated a few days ago. Major Learmont commanded the horse at the battle of the Pentlands, and for conscience sake was among those who for many weary years were "hunted like partridges upon the hills." On the edge of this picturesque "God's Acre" is a giant sycamore 8 ft. 6 in. in girth at 5 ft. from the ground, and supposed to be over 200 years old. At the foot of the walk, and at the corner where two public roads meet, is another sycamore 12 ft. in circumference of stem at 5 ft. from the ground, and 70 ft. high. This is the largest tree in the parish, and its graceful outline appeared to enchant some members of the party—so long did they linger near it—as much as did the sycamore which Xerxes encountered in Greece. The great Persian invader was so enraptured with the beautiful appearance of the plane that he could not prevail upon himself to leave it. He lingered about it for a day and a night; he encircled it with a golden collar hung with costly gems, and had a gold medal struck with a representation of the sycamore which had so entranced him. No girdling collar other than a steel tape encircled the Dolphinton tree; and the only votive offerings which our party hung on its graceful boughs were heartfelt regrets that swift-winged time called us imperiously to bid farewell to beautiful, hospitable Dolphinton.

Jumping into our carriages, and with one last fond look at the shadow-streaked valley, at the emerald and gold fields, at the flickering lights on the umbrageous woods, we speedily leave the pleasant glades of Dolphinton behind and are bowling along a first-rate road southwards and eastwards. Ascending a steep brae we are ushered into the mountainous district of Peeblesshire. Everywhere we see evidences of skill, care, and judgment in the laying out of plantation; perhaps the most notable estate being that of Medwyn, the property of William Forbes, Esq., a most enterprising planter, on which are large tracts of admirably disposed young wood. For a short distance the land may be said to hang doubtfully on the common lip of Tweeddale and Clydesdale, but presently we cross the watershed and enter the valley of the silver Tweed and its rippling, argentine tributaries. The eye is attracted by the finely curved form of the hills and their exquisitely verdant dress exhibiting the activity of the hand of the reclaimer, and on every suitable spot the no less judicious industry of the planter. Every now and again we crest ridges from 900 to 1,200 ft. above the sea-level. The whole country we are now traversing may be said to be mountainous, yet it is free from those deep precipices and long stretches of bleak, barren moss which impart to the highland landscape their rugged grandeur. But we cannot say that the landscape, composed of an endless succession of rounded and entwined hills and eminences, with winding valleys clothed with grass of the brightest green, or adorned by young plantations, is uninteresting or unpleasing. True it is not of that rolling soft character which makes many parts of England and the lowlands of Scotland so attractive. Nevertheless this rapid unfolding of hill and dale with varied views of verdant glens and meandering streams, hanging woods and long stretches of velvet sward on which blackfaced sheep are picturesquely dotted or store-cattle prettily browse, afford a rich panorama in which Wordsworth would have delighted even more in the present day than when he visited Yarrow.

> "Meek loveliness is round thee spread,
>   A softness still and holy;
> The grace of forest charms decayed,
>   And pastoral melancholy.
> That region left the vale unfolds
>   Rich groves of lofty stature."

And we approach the umbrageous dells of Castle Craig, fancying ourselves literally within the range of the mediæval Ettrick Forest, which formed part of the Great Caledonian Forest and stretched across the centre of the lowlands of Scotland from Ayrshire to St. Abb's Head on the German Ocean. Formerly in this very district there were long stretches of oak forest mingled in birch and hazel; and oaks are still dug out of the land which is being reclaimed. "Easements" of the forests were granted by that "Sair Saint to the Crown," David I., to the monks of Melrose, Selkirk and Kelso, and in the thirteenth century Edward I. and II. of England held the forest in domain. When Bruce threw off the English ascendancy in Scotland he granted the forest to Sir James Douglas, but in 1455, on the forfeiture of the Douglas family, the forest was by Act of Parliament annexed to the Crown; and there are records of great hunting expeditions to the well-stocked glades, by the monarchs of Scotland, from the time of the first of the Stuart kings, down to the unfortunate and lovely Mary. It is chronicled that in the time of the early Stuarts as many as 10,000 bucks scoured the forest, but James V. turned into the forest 10,000 sheep, and this step led to the almost total destruction of the trees. The demolition of the timber exposed the valleys and the hill-sides to the erosion of the hoar-frost and the blasts of wintry winds, till at last the whole district was changed into little else than masses of brown hill and expanses of dismal moor mocked with the rude tufting of the pigmy heath and stunted furze. Early in the eighteenth century a commencement was made with the process of recovering this fair land with a new dress of umbrageous trees which are at once an embellishment to the country and a means of tempering the blighting blasts, and to encourage a new and improved agriculture. The first improvers and planters were Dr. Penicuick, Sir Alexander Murray, of Stanhope, who flourished from 1715 to 1730, and the Duke of Argyll, who about 1740 executed a lot of planting on his then estate in the parish of Newlands. These pioneers were followed by the tenants of the Duke of Queensberry, who with sixty year leases found their account in planting for shelter; by Sir John Nasmyth, of Dalwick, the laird of Stobo, and the honourable baronet of Castlecraig.

Meantime the members of the society had reached the rich vale of Tarth with its magnificent woods, and turned aside into the beautiful policies of Castlecraig, the property of Sir Wm. H. Gibson Carmichael, Bart. The avenue to the large but plain mansion-house is impressive from the size of the lordly spruces, silver firs and elms which adorn either side of the umbrageous drive; and in the immediate neighbourhood of the house the visitors were charmed with a vision of a real old flower garden, with its splendid masses of colour afforded by pansies, poppies, sweet williams, and many showy favourites of a by-gone time. Alighting from the carriages, the company was joined by Sir James Fergusson, Bart., of Spittalhaugh, and Mr. George Carmichael, son of the venerable baronet of Castlecraig. The latter gentleman kindly undertook the task of showing the arboriculturists the beauties of his father's demesne. Turning to the left side of the mansion-house and ascending a wooded hill about 800 ft. in height, we come upon a silver fir 9 ft. 9 in. in girth at 5 ft. from the ground, and 65 ft. high. Beyond the bowling-green, now converted into a tennis lawn, and encompassed by splendid woods, the company pick out a very noble specimen of *Pinus cembra* from the Carpathians, 32 ft. high and well-furnished—backed by a splendid bank of rhododendrons 55 ft. through, and said to have grown from one stool. Side by side with this fine mass of rhododendron, was a large group of *Azalea pontica*, and here and there, rising among other species, were several very good *Abies Douglasii*. The further edge of this hill was clothed with stately silver firs, and through an opening artistically cut in the leafy boundary was a magnificent panorama of the valley of the Tarth, leading the eye o'er hill and dale, coppice and plantation, to the far-away blue peaks of the Pentlands. While one half of the company were feasting the eye and expatiating upon this wondrous view seen at its best in the flickering sunlight, the other half were discussing whether a large shrub on the lawn behind was or was not an American plant. All agreed that they had never seen the plant before, but a close examination of its botanical characteristics enabled the experts to declare that it was an American plant, and that it was most probably a *Clethra*. Passing some fine examples of *Picea Nordmanniana*, the party made their way downhill across the avenue to the slopes of the glen where the flower garden is laid out in the midst of fine old trees, principally oaks, fern-leaved beeches, and variegated planes. One of the oaks girthed 9 ft. 6 in. at 5 ft. from the ground. Close behind the kitchen garden there grows a larch, said to be 150 years old, which attracted some attention. It is 9 ft. 4 in. in circumference of stem at 5 ft. from the ground; 10 ft. 6 in. 3 ft. up, and has a clean bole of 30 ft. It is unfortunately broken off at the top, and has lost 20 of its original 80 ft. of height. This larch is supposed to have been one of the first in the country, and was originally grown in a pot before being planted on its present site. Pursuing our way out of the flower garden to the terrace overlooking the romantic dell, we note a row of grand old Irish yews, take a peep at the old parish church of Kirkurd, now an ivy-covered ruin in the midst of the fallen monuments over the graves of long-forgotten ancestors, and halt to inspect on the slope of the glen a specimen of the "Tamarac," the red American swamp larch. The twigs of this pine have the property of imparting a fine, rich, glossy coat to horses, and on this account it is seldom allowed to grow to any height near Toronto in Canada. The specimen here is 6 ft. 4 in. in girth at 1 ft. from the ground; 5 ft. 2 in. at 5 ft. from the ground, and is 70 ft. in height. It is the largest specimen of the species in the Kingdom. There were at one time several plants at Scone, but they all died out. Mr. Hutchison pointed out as a remarkable circumstance that the common Scots and Norway firs did not appear to do so well in the neighbourhood as some of the newer varieties. A descent into the dell well repaid the trouble. Perfect beauty of a rustic type was furnished by the moss-covered walls of an old mill in its weather and water-worn wheel; and a miniature waterfall, whose music made the umbrageous arcade enchanting. The undergrowth on the banks was ferns and foxgloves with blue bells and anemones; towering up to a height of from 80 ft. to 100 ft. were Scots firs, larch, ashes, beeches and poplars, and at the bottom of this fairy scene was the wimpling brook spanned by a rustic suspension bridge. An hour might have been spent in this exquisite retreat—to repeat our enthusiast's quotation from Horace:—

"Quà pinus ingens albaque populus
Umbram hospitalem consociare amant
Ramis, et obliquo laborat
Lympha fugax trepidare rivo."

"Where the lofty pine and hoary poplar delight to interweave their boughs into an hospitable shade, and the clear current with trembling surface purls along the meandering rivulet."

A few members of the party lingered to measure a grand clump of silver firs on the north side of the garden, and it was found that the two largest were 110 ft. high and girthed respectively 11 ft. and 13 ft. 6 in. at 5 ft. from the ground.

Time was on the wing, and a start was now made for Dalwick. The road followed the windings of the Tarth till it mingled its sparkling waters with the silver tide of the Tweed. The scenery in the glowing sunshine was of the most charming description, and as we bowled along at a merry pace there was time to note the most salient features. Here at the embouchure of the Flemington glen, and at the junction of the Lyne with the Tarth, are the ruins of Drochil Castle, a stronghold built by the ambitious and cruel Regent Morton, but traditionally said not to have been finished before he was beheaded. The northern slopes of the winding Tarth vale are almost covered with plantations. Where openings are found there flourish golden fields of grain nearly ready for the sickle. Anon the hill assumes a barer aspect, and the slopes afford pasture to thriving flocks of sheep. On the shoulder of a higher range of mountains jutting into the valley from the north and occupying a commanding position, is the site of a fine example of a Roman camp, which a few members of the company stopped to inspect. And here it may be noted that within the grounds at Castlecraig are two terraces supposed to have been built by the Romanized Britons, first as a species of amphitheatre, and afterwards used as seats of justice. Beyond the Roman camp and near the Tweed is Sheriff Moor, where the militia of Tweeddale assembled in ancient times at the summons of the sheriff for archery practice. It has, however, a further claim to interest as the site of a Druidical temple, of which two large erect stones remain. Leaving Macbeth's Castle on the right, we turn near Lyne railway station to the right and follow the charming valley of the Tweed for some miles, through the well-wooded and prosperous-looking estate of Stobo, until we cross the river by a neat bowstring girder bridge, and call a halt on a lovely meadow by the river-side just outside the gates of Dalwick. Here the members of the company partook of luncheon spread on the green sward picnic fashion.

The refreshments being quickly discussed, Mr. Hutchison said that although time pressed he wished to briefly propose a toast—the health of Mr. John Ord Mackenzie, of Dolphinton, who had that day afforded one more proof of his interest in arboriculture and of the society, by his kindly reception of the members at his mansion-house, and the instructive manner in which he had conducted them through so much interesting arboricultural scenery. (Cheers.)

Mr. Mackenzie, in responding, said it had been a great pleasure to him to accompany them through that high country. Where there was a will there was a way, and they had all evidently come determined to be pleased, and they had been pleased. He hoped they would have as fine an afternoon as a forenoon. (Cheers.)

Mr. Hutchison said that several gentlemen had joined their excursion that day who were not members of the society, but whom they hoped ere long to see members. (Cheers.) He referred especially to Sir James Fergusson, of Spittalhaugh, who he trusted, along with all the other proprietors in the neighbourhood, would join the ranks of the society and help them to promote the interests of forestry all over Scotland. He proposed the health of Sir James Fergusson. (Cheers.)

Sir James Fergusson briefly replied. He had been delighted to join the company of gentlemen so intelligent in an excursion, so full of interest, and under so auspicious circumstances as regards sky and weather. (Cheers.)

A move was then made for the grounds of Dalwick, or Dawick, perhaps the most exquisite estate in the south of Scotland, so far as the disposition of woods for landscape effect is concerned. It is situated on the southern bank of the Tweed, and though for the most part the valley is here narrow and the various plantations rise towards the uplands with a steep slope, which in itself gives a character to the scene, yet in some places the vale expands, as just below the policies of Dalwick, into beautiful haughs, while in others, where the tributary streamlets to the Tweed break down from the heights, it opens up into the most lovely glens. At the bottom of one of these haughs and environed with splendid plantations are the ruins of Drummelzier Castle, which was formerly the seat of the Tweedie family; and at the confluence of the Possil stream with the lordly Tweed there is a tumulus, reputed to be the grave of the celebrated wizard-poet Merlin, who is said to have predicted the union of England and Scotland in the following couplet:—

> "When Tweed and Poussil meet at Merlin's grave
> Scotland and England one king shall have."

Dalwick was laid out for the most part by Sir John Nasmyth, Bart., in the end of last and beginning of the present century, and although opinion differs as to the landscape gardener who afforded him advice, there can be no question that the planting has been done by a man who possessed not only a deep knowledge of arboriculture and the habits and growths of trees, but who was possessed of the soul of a true artist. Nothing could be finer than the endless succession of exquisite "effects" which burst upon the delighted eye, and as the rapid succession of beauties claim attention,

> "How oft upon yon eminence our pace
> Has slackened to a pause, and we have borne
> The ruffling wind scarce conscious that it blew,
> While admiration feeding at the eye,
> And still unsated, dwelt upon the scene."

It would be impossible to describe these beauties in anything like detail, and we must simply make a selection of the more striking scenes, taking care, however, not to pass over any of the important or notable trees. Entering the policies from the river side and surveying rapidly the wealth of timber in the park (some of the party alleged it was too superabundant), attention was first directed to a pair of larches said to be the oldest in Great Britain, inasmuch as tradition states that they were planted a few days before the celebrated Dunkeld specimens from the Tyrol. The story has two sides—one that Duke John, of Athole, presented the young plants to the then laird of Dalwick as he halted here *en route* to the north, and the other that the two plants were lost from the duke's carriage, and being found on the road, were planted with no particular care. Be this as it may, the pair of giants are worthy of all due care. That on the right side of the park is 17 ft. 10 in. in girth at a foot from the ground, and 14 ft. at 5 ft. from the soil

The bole is short and breaks about 8 ft. from the earth into three massive limbs which rise to a height of about 65 ft. The twin larch across the drive was blown down in 1823, but the branches have taken root and are flourishing very well, presenting a highly picturesque appearance. At no great distance is a sycamore 16 ft. in girth at 1 foot from the ground, and 11 ft. 4 in. at 5 feet, with a bole of 12 ft. Another plane is 15 ft. 2 in. at a foot from the ground, 11 ft. 8 in. at 5 feet, with a bole of 25 ft., and a total height of 70 ft. On either side of the house is a grand oak—that on the west being 10 ft. 8 in. in circumference 5 ft. from the ground, 14 ft. 9 in. at 1 foot, with a measureable bole of 35 ft., and a clear height of 80 ft. It was calculated that this fine tree would afford 120 cubic feet of timber. The oak on the east side of the mansion is 17 ft. 6 in. in girth at one foot from the soil, 10 ft. 9 in. at 5 ft., with a bole of 35 ft., and a total height of 57 ft. On the north-west near the bowling-green is another oak girthing 14 ft. 10 in. at 3 ft. up, and 80 ft. high. Although it has lost a heavy limb on the east side this is one of the finest trees we ever saw. Stretching in a direct line from the east side of the house is a magnificent avenue of limes at least 200 years old, which affords a magnificent vista down the vale of the Tweed from the windows of the villa-like residence. Making our way by a shady avenue to the upper terrace, a magnificent view is commanded of woodland and river scenery—in fact one is in doubt which to admire most, the fairylike disposition of the trees and foliage or the wide expanse of richly coloured panorama.

> "There fast rooted in his bank
> Stand, never over-look'd, our favourite pines,
> While far beyond and over thwart the stream
> That as molten glass, inlays the vale,
> The sloping lane recedes into the clouds;
> Displaying on its varied side the grace
> Of hedge-row beauties numberless square tow'r,
> Tall spire, from which the sound of cheerful bells
> Just undulates upon the list'ning ear;
> Groves, heaths . . . and some far-spreading wood."

In looking through the openings which ever and anon carry the eye either down upon the lawn or across the valley to the further wooded bank, we are struck with the distribution of the foliage, which affords a perfect study of natural and artistic effect. Such, for instance, is the combination of the columnar habit of *Picea Nordmanniana* with weeping birches; the latter again relieved by the proximity of copper beeches, and variegated holly, which carry the eye further along to pretty masses of *Cedrus Atlantica*, and to a group of grand *Pinus cembra.* Here is another vista, in which we see the Irish yew intermingled with a large clump of rhododendrons, producing a novel and charming effect as a foreground, to groups of *Picea nobilis* backed up with *P. lasiocarpa* and heavy masses of hardwood foliage. Shifting one's position only a step or two and turning the eye, we have another exquisite peep in which weeping birches intermingle with the scarlet oak, which relieve the rich deep shade of the plantations away on the other side of the Tweed with the massive turrets of Stobo Castle showing against the deep blue sky.

Growing in the wood above the terrace, leading eastward along the hill-side, is a row of grand old silver firs, together with many towering specimens of forest trees. Commencing at the west end of the row, some of the largest silver firs measure as follows:—No. 1, 14 ft. 5 in. in girth; No. 2, 12 ft. 10 in.; No. 3, 13 ft. 8 in.; and No. 4, 13 ft. 18 in.—all at

5 ft. from the surface of the ground. These splendid trees range about 100 ft. in height, and are in good thriving condition. Near to them is a very fine example of Scots fir, measuring 9 ft. 6 in. in girth at 5 ft. from the ground, and containing a large amount of straight clean timber. On the lower or lefthand side of this walk there is a line of large spreading beeches—one of the largest stemmed girthing 10 ft. 2 in. at 5 ft. up. Retracing our steps towards the upper terrace, clumps and single specimens of the choicest conifers and other ornamental trees are seen growing vigorously on the open lawn, or placed in open spaces in the plantation stretching away far up the hillside. Among others we noticed beautiful groups of *Abies Douglasii* about 50 ft. in height, and looking as much at home as if they were growing in their native habitat on the banks of the Columbia river in North-Western America. *Abies Menziesii* appears also to be a suitable tree for the planter in this elevated region, many of the specimens here having attained a height of about 60 ft., and growing with the greatest luxuriance.

On the smooth grassy slope, between the high terrace and the flower garden, are numerous splendid examples of the newer Coniferæ, among which may be specified the gracefully silver foliaged deodars (*Cedrus Deodara*) about 45 ft. high; *Picea nobilis* 40 to 45 ft. high; *P. Nordmanniana*, 25 to 30 ft. high; *P. grandis*, 20 ft. high; *Wellingtonia gigantea* and *Cupressus Lawsoniana* 15 to 20 ft. high; *P. cembra*, *P. laricio*, and *P. Austriaca*, from 40 to 50 ft.; *Thujopsis borealis*, 15 ft.; *Abies Albertiana* and *A. Canadensis*, 25 to 30 ft. high; *Araucaria imbricata* 20 to 25 ft. high; and many others, all in vigorous health, and forming beautiful specimens. Among other choice deciduous trees the upright oak (*Quercus pedunculata fastigiata*) forms here a conspicuous feature, numerous specimens reaching 40 to 45 ft. high.

Following the path which leads up the glen, we are transported to a new and not less lovely scene. It is a veritable wilderness, overshadowed by the most graceful leafy arcade.

> "So sportive is the light
> Shot through the boughs, it dances as they dance,
> Shadow and sunshine intermingling quick,
> And dark'ning and enlight'ning, as the leaves
> Play wanton ev'ry moment, ev'ry spot."

Here rare and beautiful trees rear their feathery arms in wild luxuriance above an undergrowth of ferns and foxgloves, periwinkle, honeysuckle, wild roses, and spiræas, which, flowering in profusion, made the air odorous with their rich perfume. The airy manner in which many of the trunks and branches of the trees were embraced by the graceful festoons of the woodbine and the honeysuckle was positively enchanting, and formed a beautiful contrast to the rich ivy drapery of some of the older trees. All that was needed to complete the picture of a fairy grove was found in the rustic bridge spanning the purling brook which sang its thrilling lay at the bottom of the dell. This bridge had its parapets covered with the glowing masses of honeysuckle, and from its pointed arch there drooped the prettiest of stalactites. Just below the bridge, by the clearing of a few branches in the bank of beeches, a stereoscopic view of the vale of the Tweed as far as Stobo Castle is afforded, the eye being led past the varied outline of ash, weeping elm, sycamore, weeping birch, and copper beech. Climbing the bank to the old church on the shoulder of the hill, we pass a larch with a clean stem 70 ft. in height and with a circumference of 8 ft. 8 in. at 5 ft. from the ground. Right and left of the chapel are a venerable ash and sycamore, while surrounding the open are many fine specimens of *Abies Douglasii*, *Picea nobilis*, *Pinus cembra*, *Abies Menziesii*, *Pinus Austriaca*, and *Pinus laricio*, from 55 to 70 ft. high, intermingled with weeping birches, 70 ft. high, weeping elms, copper beeches, and scarlet oaks, while to render the scene for ever memorable there spanned the valley a radiant rainbow—fit setting to so enchanting a picture.

It was only the remembrance that we had yet to explore the woodland recesses of Stobo that gave us courage to tear ourselves away from these lovely glades; and regaining the carriages in the level light of the afternoon sun, we sped on our way towards the seat of Sir Graham Montgomery, Bart. Recrossing the Tweed by the bridge and making a steep and slow ascent to the high road, opportunity was given to catch a distant view of the Dalwick woods, with the avenues of limes and horse-chestnuts near the river and the fertile strath beyond. Entering Stobo policies, we drive along a steep hillside covered with thriving plantations of well-grown trees, and presently find ourselves within the grounds of Stobo Castle, and are arrested by the magnificent golden and silver hollies which adorn the park and the lawn.

Driving up to the old baronial castle, richly clothed with ivy, the party were warmly welcomed by the hon. baronet of Stobo, and invited to partake of afternoon tea. Availing themselves of this kindly and thoughtful hospitality, Sir Graham led the way through the great hall, adorned with many a memento of chase and war—from Western prairies, African forests, India's coral strands, and Afghan's impregnable hills and sacred cities—(a gallant, stalwart son of the genial baronet has just returned invalided from Cabul)—and into the grand old dining-room adorned with family portraits by Romney, Raeburn, Sir Francis Grant, and Miss Montgomery, whose pictures have caught the rich colour of the great masters by the side of which they hang. A substantial tea and luscious refreshing fruits were served with true border hospitality, and Sir Graham did all that a border chief of ancient lineage could do to render his guests happy.

Mr. John Ord Mackenzie, on behalf of the Society, briefly thanked the hon. baronet for his warm reception, and apologized for the hurried visit which the claims of time only permitted them to make to the arboricultural treasures of Stobo. Perhaps on some other occasion, with Sir Graham's permission, the members of the society would pay a more leisurely visit to the Stobo woods and plantations.

Sir Graham Montgomery expressed the pleasure that he had in receiving the party and said that he would be delighted to have the members of the society to visit Stobo woods and plantations at any time.

A few moments were spent in admiring the grand views from the Castle windows—views embracing the windings of the Tweed, long stretches of verdant Peeblesshire hills, wooded parks, close phalanxes of plantations, till the horizon was bounded by the further peaks of the Moorfoot and Leithen Hills. Under the leadership of Mr. Ainslie, factor for Sir Graham Montgomery, the company then proceeded to take a rapid glance at the more notable trees in the park. On the terrace to the right of the Castle are some magnificent beeches; one measured 15ft. in girth at 5 ft. from the ground, and 75 ft. high, with a spread of branches of 60 ft. This venerable tree has its heavier limbs secured with iron bars. Below it is the flower garden; the special features of which are baskets containing tastefully-arranged plants of *Humea elegans* and gladioli, on a groundwork of *Cineraria maritima*, dotted with scarlet geraniums, and edged with blue lobelia. These baskets are prettily dispersed among beds of fuchsias, coleus, calceolarias, on a groundwork of golden pyrethrum. Pursuing our way into the park we note several fine larches, beeches, and planes, at an altitude of 700 ft. Here is a silver fir 100 ft. high and 10 ft. in circumference of stem at 5 ft. from the ground. In the low ground of the Home Park is an oak 11 ft. 8 in. in girth a foot from the soil, and 9 ft. 4 in. at 5 ft. up, with a bole of 35 ft. Leaving the beautiful and richly-wooded park a hurried run was made through the garden, the most attractive feature of which is Lady Montgomery's herbaceous border. This unique garden contains the finest collection of herbaceous plants we have ever seen. Many of the plants are now almost out of general cultivation, but ought to be more grown, producing as they do a succession of flowers from the earliest days of spring till about Christmas. It would take up too much space to enumerate even a tithe of the beautiful specimens, and hence we simply recommend this extremely interesting garden to more general notice, as an example of what may be done for conserving old-fashioned and tender-memoried gardening. At the foot of this garden is a Wych elm, which measures 16 ft. in circumference of stem at 3 ft. up, and is one of the grandest trees we have seen during our peregrinations. With the measurement of this tree we bid adieu to Stobo, and commenced our journey to Peebles, the road following all the way the windings of the Tweed.

The banks are nobly clad with thriving plantations, and the scene is one of uninterrupted loveliness. Nearing Peebles we come upon Neidpath Castle, the largest and most massive of the feudal strongholds still extant and inhabited in the south of Scotland. It readily attracts the attention of the passer-by from its situation on a rock, which projects boldly over the north bank of the Tweed. Its walls are 11 ft. thick, and tower to a great height over the river, forming a very conspicuous object in the scenery. In the early part of this century it was encompassed on all sides, except that towards the river, by ancient "monarchs of the forest." The last Duke of Queensberry ruthlessly destroyed these woods, and was pilloried by Wordsworth for his barbarous avariciousness in the following lines:—

"Degenerate Douglas! oh, the unworthy lord
  Whom mere despite of heart could so far please
  And love of havoc (for with such disease
Fame taxes him) that he could send forth word
To level with the dust a noble horde,
  A brotherhood of venerable trees,
  Leaving an ancient dome and towers like these
Beggared and outraged! Many hearts deplored
The fate of those old trees; and oft with pain
The traveller at this day will stop and gaze
On wrongs which nature scarcely seems to heed;
For sheltered places, bosoms, nooks, and bays,
And the pure mountains and the gentle Tweed,
And the green silent pastures yet remain."

A few trees which were spared were pointed out to the excursionists. They consist of but a few trees, chiefly yews, scattered a short distance east of the castle, on the precipitous banks of the Tweed. Yews extend in a line eastward from the castle, and probably are the remains of an avenue or a sheltering walk of the ancient garden which is now extinct. The second last tree in the line is the parent of the variety known as the Neidpath Yew, and it still bears very distinctly the upright habit and dark appearance which is the peculiar characteristic of the variety. These yews seem to be at least 300 years old, and appear quite vigorous and healthy. Long may they flourish—a landmark among the young plantations which are growing up in their near neighbourhood. In a few minutes the pretty town of Peebles is reached, and the party alight at the Tontine Hotel, after an uninterrupted day of eleven hours in the open, and a drive altogether of nearly 30 miles.

The members of the society dined together in the Tontine Hotel immediately on their arrival, as many of them desired to return to Edinburgh by the 7.50 p.m. train. Robert Hutchison, Esq., of Carlowrie, occupied the chair, with Mr. Wm. McCorquodale, croupier.

The Chairman proposed "Prosperity to the Scottish Arboricultural Society," coupled with the health of the gentlemen who had so freely placed their domains at their disposal, and who had so kindly received them that day at the different places they had visited. (Cheers.) They were greatly gratified at what they had seen and at what they had been told regarding the beautiful woods through which they had wandered. (Cheers.) He was sorry that so few members of the society had been present, but still those forward were a truly representative sample—embracing many old foresters, some new members, and many of the nurserymen of Scotland. He regretted that so few proprietors had come to get hints from the foresters in the woods, for he was sure that they would have derived much more instruction by meeting with the foresters and hearing all that they had to say on different practical points than even by reading the *Transactions* of the society or any theoretical book on the subject. (Hear, hear, and cheers.) Along with the toast of the society he would couple the name of their venerable and esteemed croupier, Mr. McCorquodale—(cheers)—and along with the name of the proprietors, Mr. France, who represented the honourable baronet, the laird of Penicuik, to be visited on the morrow. (Cheers.)

Mr. McCorquodale said he felt much gratified in having his name coupled with that of the Arboricultural Society. He was sure that one and all had enjoyed the day's work. They had been very fortunate in getting good weather, and he had no doubt they were all benefited by what they had seen. He agreed with the chairman that if proprietors came to these excursions they would find them not only highly interesting, but beneficial. (Hear, hear.) The only regret that perhaps they had was that they had had too much work to get through that day in visiting so many beautiful places, and too little time to devote to each place and to make a thorough inspection of the woods. (Hear, hear.) He would have liked to see more of the young plantations, for a great deal might be learned by studying the management and training of young trees. It would have been very advantageous, especially to the young foresters, to be able to fully inspect the younger plantations. (Cheers.)

Mr. France returned thanks for coupling his name with that of the proprietors who had placed their demesnes at the disposal of the society. As one of those deeply interested in the society it was with the greatest possible pleasure that he looked forward to the society visiting Penicuik. As a practical forester he thought it was a great boon for the members to be permitted to make an inspection of so many places, and to compare notes with the foresters for their mutual benefit. (Cheers.)

Mr. Dunn said he had to propose a toast in which he was sure all would join most heartily—viz., long life, health and prosperity to their worthy chairman. (Cheers.) Mr. Hutchison set a good example to the landed proprietors. His services were always at the disposal of the

Arboricultural Society, and the great interest he took, and the anxiety he displayed in carrying out the excursions was an example which many might follow. Mr. Hutchison showed to the proprietors of the country that the practice and encouragement of arboriculture was its own reward. Very much more thought would have to be given to our forests and practical forestry in the near future than ever had been devoted to them in the past. (Hear, hear.) It was a good augury for the future prosperity of forestry that they had so many landed proprietors members of the society; and so far as his memory served, they had had that day more proprietors present at their excursion than on any former occasion. (Cheers.)

The Chairman, in acknowledging the compliment, said that nothing gave him more pleasure than to meet with the Arboricultural Society, whether it were in the council, or in the annual meeting, or in the field. (Cheers.) There was no doubt that the pleasure in the field was greater than at the council board, and further, that the pleasures of the social board were curtailed by the exigencies of the North British Railway. (Laughter.) He wished before separating to propose the health of their new Secretary, Mr. John McLaren, jun. (Applause.) He could assure them that the way in which the Secretary was working the ship was worthy of all praise. The way in which he had surmounted all difficulties and got the society into good working order did him a great deal of credit indeed; and if he went on as he had begun the society must prosper still more under his care. (Cheers.)

Mr. J. McLaren, jun., in reply, said he was obliged for the kind way in which the Chairman had spoken of him. With the willing assistance which he received from each member of the Council he hoped the society would go on increasing and flourishing more and more in future years. (Applause.)

After the members who returned to Edinburgh had left, Mr. McCorquodale assumed the chairman's duties, and a very interesting discussion arose as to German, French and British forestry. It seemed to be the general opinion that young men destined for the Indian forest service might derive in the forests of Britain all the needed experience, the only drawback here being perhaps a lack of opportunity for the study of administration. But even this latter desideratum could easily be supplied at home in a properly constituted Forest School. The manner in which Government awarded the few "prizes" in forest management in this country to non-professional men was also referred to, and a hope was expresed that the day might soon come when the foresters of this country might look forward to attaining say the position of ranger of the New Forest, or Forest of Dean, instead of seeing these posts filled by gentlemen totally ignorant of the duties of a forester.

### SECOND DAY.

The second day, Friday, 6th, broke fair and promising, and the active members of the party were early astir, to get a sight of the picturesque county town and the lovely scenery amidst which it is planted. However, at the hour for starting for the day's work the muster had dwindled down till we were reminded of an old story. Many years ago an ancient toper, in making his way homewards after a late sederunt with a number of equally "drouthy cronies," wandered into the village churchyard, and stumbled into an open grave which the sexton had prepared in view of a burial the following day. The overcome tippler fell asleep in the grave, and was only roused the following morning by the guard's horn as the stage coach passed through the village. Giving himself a shake, he opened his eyes from a dream that he had been dead, found himself in a grave and as gravely concluded that the last day had surely come. Scrambling out of his cold and narrow bed he looked round, discovered that he was alone, and regretfully commiserating the lax morals of his native town cried, "What a puir turn oot for Kilbarchan." Far be it from us to insinuate that a like cause produced like effects with the members of the Scottish Arboricultural Society; yet true it is, and of verity thereof, that on Friday morning when the horn was sounded for the start for King's Meadows, with the inspection of which the excursion of the day was to begin, there was a "waefully puir turn oot for Peebles!" The calls of business or otherwise had dispersed the happy company of yesterday, and only some half-dozen enthusiasts followed Mr. McFarlane, gardener to Sir Robert Hay, Bart., in the walk through the woods on Sir Robert's beautiful estate of King's Meadows on the banks of the Tweed. The morning was very pleasant, and the ramble agreeable. The party were first shown by Mr. McFarlane over the tastefully laid-out policies and gardens. An inspection was next made of the fine limes, spruces, and silver firs, some of which are remarkably tall and handsome trees, furnished to the ground with their gracefully sweeping branches. After examining many other notable trees within the grounds, the extensive and well-cultivated forests of Glentries and Newby, on the Smithfield Estate of Sir Robert Hay, were pointed out to the company, and at the old family mansion of Haystoune, about two miles to the southward, are many grand old trees, particularly oak, beech, ash, spruce, and Scots firs, but time did not admit of a visit to them. In the course of the ramble through the policies numerous examples were noticed of shrubs and plants which had been all but irretrievably damaged by the severe winter of last season, when the thermometer sank as low as 12° below zero.

The party returned to Peebles in time to catch the 10.10 a.m. train to Eddlestone, where they were met by Mr. John Smith, forester to Colin J. Mackenzie, Esq., of Portmore, and conducted through the young plantations under his care. Since Mr. Mackenzie's accession to the estate he has planted over 500 acres, and considerable improvement has been made in the old woods, which had been in his predecessor's time somewhat neglected. These young plantations look very healthy and thriving, and the best trees are the spruces and Scots firs. In the long drive up to the house on the edge of a little glen, we were struck with the beauty of the scarlet-berried elder, among the mixed plantation which hems in the drive for the greater part of the way. Around the nicely situated castellated mansion-house—where, by the way, the company were hospitably entertained by Mr. Mackenzie to a cake and wine refection—there are some tall, healthy silver firs combined with weeping birches, which give a pretty character to the demesne. After a glance at the gardens, which have recently been remodelled and are therefore in a transition state, we made for the Northfield Rings, a plantation 1,178 ft. above the sea-level. Half-way up we pass through a plantation of silver fir, spruce and Scots fir. A few old trees on the higher part of the enclosure looked vigorous, but all the young plants were sickly, and mostly in a dying condition. Four different times had this enclosure been planted, and as often had it been destroyed by the ravages of the beetle. On the shoulder of the Northfield Rings, there stood a plantation of 90 acres, the trees being from 15 to 20 years of age, and almost every one of them were blown down by a hurricane which swept the face of the hill one wild night some years ago. In the Northfield Rings, which is a thriving wood of spruce and silver fir with some larch, we come upon a very handsome pyramidal tree of *Abies orientalis* 45 ft. high, and as thick as a privet hedge down to the very ground. A grand specimen for such an elevated site. A short time was spent in examining the Roman camp on the crest of Northfield Hill, and then we made for Portmore Loch, along whose pretty banks we walked till the highway was reached, where we found carriages to convey the party to Penicuik.

During the drive there were several heavy showers of rain, which seemed a bad look-out for our inspection of the classic woods of Penicuik. Mr. France, overseer to Sir George D. Clerk, Bart., of Penicuik, received the company at his residence, where luncheon was provided, Mr. France kindly giving the shelter of his roof owing to the heavy rain which at this time came down in torrents, after which Mr. Sadler, Curator of the Royal Botanic Gardens, Edinburgh, who, with a number of other gentlemen, had now swelled the company to a goodly size, took the opportunity of proposing long life, health, and prosperity to Mr. and Mrs. France. The toast was warmly pledged, and Mr. France briefly and feelingly replied. The weather having cleared somewhat, a move was made for the woods, where the whole of the afternoon and early evening was most pleasantly and profitably spent.

Penicuik House is situated on the picturesque banks of the North Esk, a stream whose beautiful meanderings have inspired more lyric poetry than almost any other in Scotland. Almost every variety of scenery is found in a ramble through the extensive policies; long stretches of waving woods, ample expanses of verdant pastures; the windings of the clear river as yet untainted by the off-scourings of the paper mills, through the recesses of a deep glen; vistas afforded by spacious avenues of lofty and ancient trees; secluded nooks by the shores of fairylike lakes, and the elegance of the highest horticultural art in admirably laid-out flower gardens. The handsome Grecian pile which constitutes the residence of Sir George D. Clerk, Bart., was designed in 1741 by the present baronet's great grandfather, Sir James Clerk, to whose fine taste are also due many of the park embellishments. The present laird has done much to improve the property, and under the judicious and skilful direction of Mr. France, old woods and new are in the best state of order, thriving most vigorously, and making the place look more charming every year.

When a start was made Mr. France led the way up the Serpentine walk which overlooks the deep glen of the North Esk, and brought us at once into the region of veritable giants of the forest. Here is a Scots fir 9 ft. 6 in. in girth at 5 ft. from the ground, with a bole of 12 ft., from which the tree branches into a series of limbs. Just beyond is a beech 10 ft. 6 in. in girth at 5 ft. up, with a straight stem of 65 ft. Passing a multitude of magnificent elms and oaks, which are in splendid vigour, contrasting well with those we observed yesterday in Peeblesshire, scarcely one of which was free from "spot," we come upon a notable group of Scots fir, which adorn the steep bank sloping to the river. A few are measured with the following results:—No. 1, 8 ft. 2 in. in girth at 5 ft. from soil, with 25 ft. of clean timber before a branch is encountered; No. 2, 7 ft. 2 in. in girth, 5 ft. up, with a clean stem of about 40 ft.; Nos. 3 and 4, 8 ft. and 9 ft. 3 in. respectively in girth, each of them 60 ft. high, with a clean bole of 35 ft. The beautiful red colour of the bark of the Scots fir is specially marked in these fine trees. Now we come upon a beech 13 ft. 6 in. in circumference of stem at 5 ft. from the ground, and 15 ft. at a foot from the soil; an ash 10 ft. 5 in. in girth at 5 ft. up, with a clean stem of 12 ft. There are also some very fine spruces, and Mr. France states that two years ago these trees had the appearance as if they were dying, but this year they have given signs of making a new start, and have now quite a vigorous green appearance. At the end of the Serpentine walk a magnificent panorama is disclosed, the wooded banks of the picturesque glen taking a fine curve and carrying the eye away between the varying tints of foliage to the ruins of Brunstane Castle, and the ridges of the western extremity of the Pentlands. Turning to the right we reach the new main entrance gate with its pretty lodge, and smooth, well-kept drive sweeping round the crest of the valley to the mansion. Here we employ the tape on a grand silver fir which stands sentinel at the entrance. It is 10 ft. 5 in. in girth at 5 ft. from the ground, and 12 ft. 3 in. just above the "conoidal base," with a total height of 85 ft. But a still finer plant was yet to be shown. Crossing the highway and entering a plantation a hundred yards from the lodge, we encircle a silver fir with the tape, and find it 11 ft. 7 in. in circumference of stem at 5 ft. from the ground, and 13 ft. 10 in. at 1 ft. The stem rises straight and clean to the height of 45 ft. when it branches out into three heads which attain a height of 90 ft. This silver fir was evidently planted about the same time as its neighbour, measured a few minutes before, and the pair unquestionably tower above all the other trees in the plantation. Under the shadow of this monarch a short discussion arose as to the growth of the silver fir and the value of its timber. It was agreed that when once fairly started, the silver fir grows away at a great rate, and produces a larger quantity of timber than almost any other tree in a given time. The timber stands wear and tear well, and Mr. France gave an instance of this. He knew of a log of silver fir having been used for making a trough to carry a head of water to an overshot wheel, and with a simple coating of tar the wood had served its purpose for over thirty years, and remained as sound as on the day it had been cut. Nearly all the foresters present corroborated the character for standing well in any situation thus given to the timber of the silver fir; and an additional recommendation of the wood is that it does not warp. These useful qualities should be better known and its value recognised for building and other purposes.

Returning to the policies we make our way by the main approach to the park, obtaining every few score yards the most exquisite views, and lingering for a minute on the bridge which spans a tributary of the North Esk, and from which the vista of tall spruces and other conifers is very picturesque. Just beyond this the park is studded with some grand old trees, and we measure a few of the more prominent specimens. Here is a lime 9 ft. 4 in. in girth at 5 ft. up, and 13 ft. at 2 ft. from the base; there an oak 12 ft. 8 in. a foot from the soil, and 10 ft. 3 in. at 5 ft. up; yonder a Scots fir 10 ft. 7 in. at 5 ft. from the ground, and 12 ft. 9 in. at 2 ft. up; a sycamore 9 ft. 10 in. at 5 ft. up, and 13 ft. at 1 ft. from the ground, with a clear bole of 20 ft. and a spread of branches of 51 ft.; an ash 12 ft. 3 in. at 5 ft. up, which at about 12 ft. from the ground breaks into two great limbs, and in the bifurcation there is growing a tolerably sized mountain ash. Among the other trees measured in the park were a sycamore 12 ft. 8 in. at 5 ft. up, and 15 ft. at 2 ft. from the base (this tree had lost a large limb which had become too heavy for support, and had broken off); an ash 11 ft. 4 in. at 5 ft. up, and 14 ft. 4 in. at 1 ft. from the ground; an elm —the largest on the estate—11 ft. 4 in. at 5 ft. up, and 14 ft. 7 in. at a foot from the soil. To the right of the mansion is a grand avenue of limes, and the vista carries the eye to a clearing in the ridge on the opposite bank of the glen, where an obelisk raises its needle-shaft to the memory of Allan Ramsay the poet. Ramsay was an intimate friend of the Sir James Clerk who did so much to embellish the grounds, and in the dining-room of the mansion is a portrait of Ramsay, painted by Aikman, a celebrated painter of his day. On the back of the portrait Sir James Clerk wrote the following lines:—

> "Here painted on this canvas clout
> By Aikman's hand is Ramsay's snout;
> The picture's value nane can dout,
> But ten to ane I'll venture;
> The greatest critic will not tell
> Which of the two doth maist excel,
> Or in his way should bear the bell—
> The poet or the painter."

Passing the stately porticoed mansion standing amid a wide extent of smoothly shaven lawns, we make our way to the offices, which form a large square with an arcaded portico surmounted by a clock-tower and spire at one end, and at the other a dome—a replica of the Pictish temple on the Carron, near Falkirk, popularly known from its shape as "Arthur's Oven." From the offices a by-path leads to the American garden, formerly the flower garden—beautifully surrounded by plantations containing a variety of all that is rich and rare in the newer Coniferæ. Among the notable things in the American garden may be mentioned *Retinospora pisifera*, and others in great variety, and of very unique character, and among which the variety *R. plumosa aurea* keeps its golden colour with the most striking effect. From this garden we are led to the loch, five acres in extent, and one of the most beautiful sheets of water we ever saw. From no part of it can you see its whole extent, so admirably has it been planned on the site, we believe, of an old marsh; and among the beautiful trees which encompass its windings or adorn its islets, we note a group of beeches with clear stems of 40 ft. before the bole is disturbed by a branch. There are some silver firs—the largest being 12 ft. 5 in. in girth at 5 ft. from the base, and 14 ft. 1 in. at a foot from the ground, with a stem of 30 ft. On the loch itself are flocks of swans, Canadian geese, coots, and other water-fowl, and at many different points the views are simply entrancing. It was on this loch that John Clerk, of Eldon, as a boy, achieved his first notion of aquatics, and developed that bent of his genius which produced his great work on naval tactics.

The gardener, Mr. Buchanan, now took the party in hand, and guided them to the new garden on the slope, leading up to which is a fine plant of *Abies Hookerii* and many other interesting trees and shrubs. This garden, designed by Mr. M. Dunn, of Dalkeith Park, is, with its accompanying houses, the most compact and complete in the country. The garden itself is enclosed by a hollow brick wall 10 ft. high, and a border for fruit runs round three sides, outside. The entrance is by a magnificent scroll iron gate surmounted by the arms of the Clerks. A spacious broad flight of steps leads from the garden devoted to fruits and vegetables—though the central borders are utilized for roses and other flowers—to the upper terrace, which consists of a grass lawn with neat, well-filled flower plots. The terrace forms an admirable front to the magnificent range of houses 310 ft. in length. On the centre of the range is the large conservatory, which projects 55 ft. from the fruit houses, and effectively breaks up and diversifies the line of glass. Everything is in greatest luxuriance, and we were forcibly struck with a *Dicksonia antiartica*, the largest specimen, or rather with the largest crown we have ever witnessed. *Brugmansia arborea*, with its huge trumpet flowers, was also particularly striking and effective. As to the fruit houses, the range is flanked by peach houses bearing magnificent crops upon arched iron trellises worthy of inspection. Between the peach houses and conservatory are four vineries, all containing splendid crops—if one grape was more notable than another, it was the huge bunches of the large-berried Duke of Buccleuch grape. The stove and greenhouse come between the vineries and the peach houses. Whether we regard design, arrangement, method of ventilation, or finish, this range is, as we have already remarked, the most complete we have ever inspected. The whole houses are heated from one furnace, and the flue is carried up a rising slope to the centre of a plantation, where a handsome shaft carries away the smoke. By this means a double object is served—the glass is kept free from soot, and the tall chimney forms no disfigurement to the general effect of the garden. At the back of the ranges of houses are the tool houses, potting sheds, fruit rooms, seed stores, gardener's room—each man has a nice room to himself—dining-room, kitchen, head gardener's office, &c.

By this time the afternoon was far advanced, and we had to postpone to another occasion the inspection of the woods to the eastward, where the conspicuous round tower rises on a high point of the estate. Mr. France then conducted the party through the lime avenue down to the bottom of the glen, where some grand timber was exposed to view. On the bank is a beech 15 ft. in circumference of stem at 5 ft. from the ground, and 18 ft. 2 in. at one foot from the surface, with a bole of 20 ft. The tree was calculated to contain 500 cubic ft. of clean wood. Another beech was 12 ft. 6 in. in girth at 5 ft. from the soil, and 15 ft. 6 in. at one foot up, with a straight bole of 24 ft. and a spread of branches of 100 ft. The walk along the lime avenue at the river side and under the shade of some fine conifers was a pleasant wind-up to one of the most successful excursions the Scottish Arboricultural Society have ever enjoyed, and the party reached Penicuik Station in good time to catch the train that landed them in Edinburgh about half-past seven o'clock.

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SETTING FIRE TO A WOOD.—Edward Ryan, 25, labourer; James Smith, 26, labourer; and Isaac Silverwood, 26, labourer, were indicted for unlawfully setting fire to part of Pothouse Wood, at Ecclesfield, the property of Benj. Abraham Irving.—Mr. Thomas prosecuted; prisoners were undefended.—On the afternoon of Sunday, May 16th, smoke was noticed to proceed from the wood in question, and it was ascertained that part of it was on fire. Near the fire were the three prisoners, who declined, when requested, to assist in extinguishing the fire, and went away. The extent of damage done was £10.—Prisoners were found guilty, with a recommendation to mercy. They were each sentenced to three months' imprisonment.

## ENGLAND.

Whenever free access to the woodlands can be had without interfering unnecessarily with the game, every effort should now be made to push forward pitting and other work preparatory to the planting season. All wood hedges should be trimmed, road materials carted, drainage carried forward, and the pruning of maple, sycamore, and birch completed. The seeds of any of these may be collected as they ripen, and the birch seeds may be sown at once, though the maple and sycamore seeds are better kept till spring.

The planting of evergreens may be proceeded with, and in dry weather these should be liberally watered and well mulched. Layering should also be proceeded with, and coppice stools should be thinned out for future operations. Plantations of the past year will require a careful examination, all dead plants being removed, and weakly ones cut off near the ground. After these have been gone through, and a calculation made of the requirements for new plantations, the forester will be in a position to give orders for necessary nursery stock.

Wherever either wood or iron fences remain unattended to, painting and tarring should at once be finished up.

Towards the end of the month the larger deciduous trees may be transplanted. The golden maxim of Theophrastus that no tree should be permanently planted out in a poorer soil than that in which it was reared is well deserving the attention of all arboriculturists. Unless a proper preparation of the trees has been made by opening out, so as to increase and strengthen their preservative qualities, but little success can be expected. Autumn transplanting of all strong deciduous trees is at once the best and safest method.

The early days of September afford the best season for laying down to grass woodland lawns and wood rides generally. For plantation roads sow a mixture of Timothy grass, tall fescue, meadow foxtail, and hard fescue,—two pounds of each; rough cocksfoot and smooth-stalked meadow grass,—three pounds of each; sweet-scented vernal, four pounds, rough-stalked meadow, four pounds, and wood meadow seven pounds—in all twenty-nine pounds. These may be varied either for light or dense cover according to requirements.

Towards the end of the month, if the ground for planting is not ready, take up deciduous plants and lay these in by the heel upon warm and fairly dry soil.

Continue to dig and hoe in the nursery and clear away all weeds to the rot heap. Small hollies and evergreen oaks may be transplanted, and the smaller evergreens should at once be raised and sheughed until required for planting.

Collect composts and turn and prepare old heaps for transplanting work. Also dig round and lay open the straggling roots of larger trees for future removal, afterwards refilling the trenches with prepared soil, and replacing the turf where necessary.

Before the busy planting season comes on the falls of underwood should, if possible, be allotted and measured off. Small lots as a rule command relatively higher prices than larger ones.

*Pluckley, Kent.* A. J. BURROWS.

## SCOTLAND.

The present may be considered the season of the year in which the forester has most time on his hand to devote to pruning, and this operation should be undertaken during the present month, or as early as practicable.

The great pecuniary advantage of pruning hardwood can only be fully estimated where it has been judiciously practised for a lengthened period. Without a regular method of training trees they may, by mere accident, produce a clean single bole, but where pruning is adopted at an early stage this is made absolutely certain. The difference between hardwoods, especially elm and oak, that have been pruned, and those which have not, is sometimes very great. When exposed for sale there is much less offal or refuse in a plantation that has been systematically pruned and there is more marketable timber, hence a greater return. It need scarcely be mentioned here that anything approaching the malpractice of lopping away large branches should be thoroughly discarded. The operation as far as possible on live branches should be confined to shortening only—always keeping in check any of the branches having a tendency to form contending leaders—in short, train the tree so as to direct its energies into one central stem, thereby ensuring a greater amount of marketable timber ultimately.

Still have an eye to keeping the nursery, drives, and walks, clear from weeds. The dry weather of the past month has been very favourable for this. W. W. R.

## WALES.

As the workmen who have been employed at harvest operations return to their usual employment, the clearing, draining, and preparing of ground to be planted during the coming season may be continued. Trench and prepare a good bed where young hedges are intended to be planted. Switch thorn hedges as last month.

Forest trees may now be pruned, and evergreens removed with good balls of earth.

Clean out all open drains and ditches, and while the weather is warm, and the rivers low, embankments may be repaired. Carriage drives and roads should also now be repaired.

Ground work improvements should be proceeded with, and where turf has to be laid down the present is a good time to perform the work. If turf is laid down during this month, and well rolled, it is not likely to suffer much from frost.

*Kinmel Park.* LEWIS BAYNE.

## IRELAND.

As recommended last month, ground for planting ought to be got ready now without delay. Finish the trimming of hedges, clearing of weeds and long grass from sides of open watercourses, and the scouring of dykes. The neglect of such work often proves most disastrous during the winter floods. Thin young plantations for sales of paling, such material being much in demand at this season, to fence the after-grass on the meadows. Good-sized spars will receive a ready sale for stack-yard purposes, and will sell very well with paling stuff. The forester ought to mark all trees intended for thinning out, early in the month, before the foliage assumes a yellowish tint, otherwise he may commit himself by cutting out a healthy and leaving a sickly tree. Pruning, where necessary, should be done while the leaves are still on the trees, but such operations would have been better if done a little earlier in the season.

Clear all shooting drives, and finish every description of work in or near pheasant coverts, as the birds must from this time forward be kept particularly quiet. Transplant all sorts of evergreens, taking great care of the roots. This is a very good time for such work, and if performed carefully will prove highly successful and a credit to the operator.

D. SYM SCOTT.

*Ballinacourte, Tipperary.*

[*Correspondents sending letters signed with initials or fictitious names are requested to enclose their name and address, as otherwise their communications cannot be inserted.*]

## DETERIORATION OF SCOTCH FIR.

SIR,—In your March and June issues I called attention to some very important points in connection with this question, to which W. W. R. has taken no objections; and on which we may therefore be supposed to agree. They are—

1st. That the majority at least of intelligent practical men engaged in the manufacturing of the best quality of Native and Baltic Scotch fir timber, agree in saying that the one is about as durable as the other, can be equally profitably worked up; and that young, soft, wide, coarse-grained timber from either side of the German Ocean is about equally perishable.

2nd. That there has been a great scarcity of true native seed for the last few years, causing famine prices, thereby seriously upsetting the arrangements of many engaged in planting operations.

3rd. That if under proper treatment it could be proven that Continental seed could produce plants as hardy as those from native seed, it would be an important advantage.

4th. That nothing could be more natural and reasonable than to find seed matured under a hotter sun than ours, more irritable than native seed; and that it would be a great advantage to planters, especially in seasons of great scarcity of native seed, if the irritability of the foreign could be toned down, so that plants grown therefrom would be as hardy as ours, especially so as foreign Scotch fir timber is found to be equally as good as our own—many say much better indeed, and that in every sense of the term.

5th. That trees from which much at least of the foreign seed can be got, have to endure more rigorous winters than ours, which they do, and that with as little injury as true native in this country.

6th. On page 25 W. W. R. says, "Continental Scotch fir does not succeed either at a high altitude; indeed, I think in its native habit it does not reach to anything like the same high range as our own." On page 111 I wished him to give facts in support of these views of his, which could be handled and looked at, or the authorities which led him so to think. I gave him mine for being of opinion that under favourable circumstances in this country they might be expected to grow up to 1,500 feet above the sea-level. W. W. R. refers to this (page 187), and quotes from Professor Balfour to the effect that on the Pyrenees they grow up to an altitude of 7,000 feet above sea-level. This leads one to infer that W. W. R. has thought over his first statements, and is more at one with me in this.

On the following points we differ, but no doubt the result of a little talking over will be that we shall come to see them from the same point of view.

7th. On page 35, W. W. R. says, "In plantations of twenty and thirty years of age, trees from foreign seed could be distinguished this winter at a considerable distance, growing along with the native pine, with the seed of which it had been mixed, by its brownish tinge and straggling head." At page 112 I asked if the two different kinds are growing in groups, with some idea of the nature of the soil and subsoil. Did he see the seeds mixed? or was he only told about them? The only reply he vouchsafes to make (page 187) is, "I am asked, how do I know that the foreign and native seeds were mixed? It might not be out of place to say that one's powers of observation are often of greater service in a case of this kind than simply taking a thing for granted." I cannot see why anything should be taken for granted here, or why he should expect much weight to be attached to his "powers of observation" where substantial facts are of the utmost importance. I again ask to be favoured with a direct answer to the questions referred to (page 112).

8th. With regard to the influence of soil upon the essential elements of trees, W. W. R. says (p. 557, vol. iii.), "However much the external aspect of a tree may be modified by soil and situation, it would be difficult to suppose they could alter its constituent parts."

Let us put all such "difficult" suppositions aside for the present, and look at facts rather. All observing people who see timber burning as fuel could not fail to notice that while a part vanished into thin air, a residuum of ashes remains in the grate, which could not be burnt.

Another thing they would not fail to notice is, that although these ashes may form a very small part of the whole, there is no timber without them. To one of a reflecting turn of mind this fact could not fail to suggest that however much a growing tree might find in the air with which to build itself up, it could neither live, nor grow into sound timber without its ashy or earthy constituents, which it can find only in the soil. I must confess to being ignorant of how "the external aspect of a tree may be modified by soil and situation," unless it be that if both are damp, they may cause lots of lichens and mosses to grow upon the bark of the tree.

On page 25 he says, "It has been said that Scotch fir will succeed on any kind of soil; and in spite of all the cry about soil, subsoil, and climate, I have seen nothing yet to refute this statement." In your March issue I cried *about soil, subsoil climate, and time* being the real cause of all the difference that can possibly exist between home and foreign Scotch fir, as well as between the different qualities of Scotch fir grown from native seed, and still maintain that none of the differences which plants from good German seed are alleged to assume, are sufficiently distinct and permanent to constitute a specific character or strain, and that with the requisite differences of soil, thinnings, and exposure, it is quite possible with true native seed, from the same tree, to produce plants possessing all the apparent differences that exist between true German and true native Scotch fir. Will W. W. R. be so good as to point out where these statements are wrong?

9th. He alleges that the German has a strong tendency to losing its leading shoots and forming contending leaders. It is difficult to see how a German Scotch fir that grows so straight upwards in its own native forests could form contending ones here without some proper cause. If he studies this more carefully he will find it due to black game, or to wild pigeons having picked the strongest buds off in winter, or to the ravages of *Hylurgus piniperda*, a misfortune to which plants from true native seed are equally subject.

10th. He says, "In the nursery it does not stand transplanting as well as native, but if allowed to remain over one year in the lines it makes a pretty good growth." We find that this can be said of *Pinus Austriaca*, *P. laricio*, but not of plants from foreign Scotch fir seed. If taken from a somewhat poor-soiled seed-bed they stand transplanting as well as the true native. Before your readers attach much importance to this, let them select plants resembling each other as much as possible, from both kinds, and from the same description of soil, and let them be transplanted in alternate lines; and one season may enable them to form a good idea whether W. W. R. or I am right.

11th. He asserts that when planted out in the forest, if much exposed, it is apt to perish the first year from sheer starvation, particularly if not transplanted every year previously in the nursery. I told your readers (page 772) that we tried a little German seed three years ago, plants from which we planted early in the spring of 1879, in high moorish soil, along with the true native pine of same age; and both are doing well; besides we have one and two years' seedlings alongside of the true native of the same age, doing equally well in our nurseries. I also stated that we are trying an experiment with Haguenaen, Riga, and true native Scotch fir seeds, thus:—In May, 1879, we prepared some soil, rich enough to grow a poorish crop of oats, and after having it well mixed, we filled with it three equal-sized boxes, and took them up to the top of a hill, about 800 feet above sea-level, freely exposed to all winds, &c. The three sorts are getting on equally well, notwithstanding the severity of last winter and early spring.

If I understand W. W. R. aright, he ordered true native Scotch fir seeds from some seedsman in the spring of last year, and sowed them in his nursery. The plants which grew from these seeds looked well up to a certain period, then his seed-beds began to look patchy—some plants having a brown colour, and some natural green. The easiest and simplest way of accounting for this was to say that the brown-coloured plants were from foreign cheap seed mixed with the expensive true native, by one of those "illicit trade" operators who are as sure to ruin our prime woods as free traders were to ruin our country years ago by the repeal of the Corn Laws.

Last winter I called on a seed and nursery friend of mine in the south, and in walking through his nurseries with him he told me he had no idea that larch exhausted soil so very much as he found it did. Pointing to a larch plot he said, "Out of that half I turned out last spring larch which occupied it for three years; and at the same time out of the other half Scotch fir which occupied it two years only, and immediately afterwards I transplanted two years' seedlings Scotch fir on the whole of it, and you see that where the larch were the one-fourth of the Scotch fir are now all brown, and where the Scotch fir were they have their natural green colour yet." I called my friend's attention to the fact that the brown plants were in patches, and that among those patches there were others quite as green as those were, where the Scotch fir, and not the larch, grew the preceding year, and that it could not be due to soil exhaustion. He then called his foreman, and after a talk over it, he discovered that in manuring the plot his foreman gave the part which grew the larch a much heavier coat than he gave the part which grew the fir, because he thought the larch being there for three years, they must have exhausted it more than the fir which occupied the other half for two years only. I then called my friend's attention to the fact that the parts with the brown plants must have been so heavily manured as to be capable of growing a good crop of turnips; because that the cells of turnips and those of Scotch fir are differently constructed, as the one was capable of rapid development, and the other of slower, and that I could point out a little of the same patchiness in our own nursery, arising from the same cause. Over-manuring, therefore, or something like it, must be the cause of W. W. R.'s failure; and as plants from foreign seed are capable of standing more manuring without being killed than true native, it would not astonish me if it should turn out that W. W. R.'s brown seedlings are the native seed plants, and the green those from foreign seed.

*Dunrobin, Sutherlandshire.* D. McCorquodale,
*Forester.*

## SEED OF ABIES ALBERTIANA.

Sir,—The following may interest some of your readers:—In the month of March last, on an estate in Lanarkshire between 600 and 700 feet above the level of the sea, I observed numerous cones on healthy specimens of the *Abies Albertiana*, about nine or ten years planted, and in passing gathered a few. On examining them at home the seeds appeared to me as likely to vegetate, and I had a considerable number of the cones gathered, from which I separated the seed and gave them to my gardener to sow. This he did on March 22 in two six-inch pots in ordinary light soil, and placed them in my vinery. In a few weeks, to my surprise and delight, I found in one of the pots about sixty healthy little plants—in the other only two; and on inquiry I found that on the seeds in the successful pot there had been sprinkled a thin covering of sand, while those in the other pot had no sand. My gardener thought I must have given him two lots of seed, one good, the other bad; but it was not so. He happened to have a few seeds left over, and these we sowed on May 8, sprinkling a little sand over them. In less than a fortnight there was here a nice healthy braird. I mentioned the above lately to several skilled foresters and nurserymen, thinking they would tell me it was their usual practice which I had stumbled on by accident, but it was not so, as the result seemed to surprise them. I shall be glad to know if any of your readers have had similar experience. If not, I venture to suggest to others who love coniferæ as I do, to adopt the plan which I have done so successfully with my little *Albertianas.*

A SCOTTISH SUBSCRIBER.

*Edinburgh, 12th August,* 1880.

## LOMBARDY POPLARS ATTACKED BY CATERPILLARS.

SIR,—In Hampshire many of the Lombardy poplars are nearly denuded of their leaves by a caterpillar, while the *Populus nigra* is not touched. Would this show that they are distinct species, instead, as considered by some authorities, that the Lombardy is only a variety of the *nigra* with fastigiate branches?

JOHN SMITH.

*Romsey, Hants, August 14th,* 1880.

## PINE SAW-FLY.

SIR,—A few weeks ago I noticed that the larvæ of the pine saw-fly (*Lophyrus pini*) had begun to devour the foliage of a few young Scots firs. that, with some larches, formed a strip along one of the railway sidings here. Rotten pieces of former sleepers, that had been removed in the course of repairs last year, lay near, some under the affected trees. I immediately got this *débris* burned, also the few twigs on which the caterpillars had clustered, thinking that the former (as an egg depository) might have attracted some pioneer flies. I see no sign of the caterpillar, with the above exception, in any of the plantations here, nor am I aware of its existence in any neighbouring ones, which makes me suppose that, in this instance, it has come from a distance. If the fly deposits its eggs in rotten timber, or such like rubbish, the question arises, how do the caterpillars appear in such numbers where there is no *débris* of this kind?

*Llanelly, South Wales.* ANGUS MCINTOSH.

## LARGE LARCH IN IRELAND.

Sir,—I send measurement of a larch tree growing singly on the lawn at Greenmount, the Irish property of Colonel Dyott, of Freeford Hall, Staffordshire. Circumference at 2 ft. from ground, 14 ft.; at 5 ft., 12 ft.; height, 55 ft.; spread of branches from north to south, 90 ft. I estimate the contents at 155 cubic ft. Soil—sandy loam. Situation—sheltered. I am of opinion that this is the largest larch tree in Ireland; at least I have seen nothing like it in travelling through the country. I should like to know if any of your correspondents know of any larger. I can get no date as to time of planting, but it must be considerably over one hundred years, and the tree is in the best of health and making vigorous shoots. There are no photographers in this neighbourhood, or I would have had one taken and sent to you.

George H. Dodds,
*Forester.*

*Antrim, Co. Antrim,*
*Aug. 20th,* 1880.

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## CUTTING DECIDUOUS TREES AFTER PLANTING.

Sir,—Can any of your readers corroborate, from their own experience, the soundness of the advice given in the subjoined extract from the pen of the late William Cobbett—an enthusiastic planter—to be found in Mr. E. Smith's Biography, vol. ii., p. 69?—

"Of two things, however, I can now speak with positive certainty: viz., that to obtain quick produce, the trees planted should be small; *and that all deciduous trees, of whatever size, should be, after planting, cut down to the ground.* Last year (March, 1807) I planted ten planes, about eight feet high. Some of them shot very well, others not, their tops dying, and the new shoots breaking out some distance from the branches.

"One of them, in the month of May, 1807, we thought was dead; but my man, thinking that there was some life in the root, cut it off within two inches of the ground. This tree is now (September, 1808) 12 feet high, a beautiful straight stem, with proper side branches, while the highest of the others (with heads too large for their bodies) is not more than 10 feet high. I have proved the same with all sorts of deciduous trees."

W. H. Hall.

*Six-Mile Bottom, Newmarket,*
*August 14th,* 1880.

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Sale of a Wigtownshire Estate.—Mr. Dean has sold the compact little estate of Polbae—extending to about 1,500 acres, and situated on the banks of the Bladnoch, in the parish of Kirkcowan. The purchaser is Mr. Marmaduke Fox, jun., of Mirfield, who has for some years been the shooting tenant of Ballochmorrie, near Barrhill. The price is about £15,000.

[*The Editor desires to call attention to several questions in recent numbers, which remain unanswered, and hopes that practical readers will assist in maintaining the usefulness of this department.*]

## QUESTIONS.

65. **The Locust Tree.**—Can any of your readers supply information as to the cultivation of Locus (or Locust) trees? I have never to my knowledge either seen or heard of these trees, but have found amongst my papers a detailed statement, dated in 1843, of the large profit made by planting and cutting them as poles at six years' growth.—M.

66. **Larch Blight.**—I shall feel specially obliged if you will kindly let me know if the blight or disease now prevalent amongst young larch will ultimately destroy the larch? or will the larch recover from the blight? I have noticed that some of the larch are dying. Nearly all the young plantations in South Wales suffer from this disease, and if it proves fatal the amount of loss will be considerable.—Wm. Smith. [The larch blight, or disease, does not always prove fatal, but the diseased trees seldom if ever entirely recover from the attack.—Ed.]

## ANSWERS.

59. **Ivy on Trees.**—In answer to "J. C., co. Carlow," I have been much troubled with ivy growing up the trees, and I find the best plan to destroy it without injury to the timber saplings is to cut it through in the month of March or April about an inch under the ground, so that the ivy does not grow again; allow it to die and drop off the trees of its own accord.—H. R. W.

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**Oak-apples.**—These galls or excrescences on the oak trees are remarkably plentiful this year in the part of Hampshire where I am residing, and I want to know which really is the true apple—the soft, spongy excrescence which is usually met with, about the size of a medlar, or the round, smooth, hard ball that resembles a large marble in appearance. I am aware that both are produced by insects, and that the true gall-nuts of commerce are the product of an Eastern oak tree, effected by an insect called the Diplolepis, but my question is simply this,—What are our native oak-apples? for I have lately heard several disputes on the subject, and I shall be very much obliged for some reliable information.—Helen G. Watney. [The hard, marble-like gall is of comparatively recent introduction near London.—Eds.]—*Gardener's Chronicle.*

# THE HOME FARM.

## OPERATIONS FOR SEPTEMBER.

*Harvest Work.*—Every effort should now be made to finish up the harvest, and as fast as the stacks are built they should be trimmed round closely and thatched. Most of the crops will have been already secured, but some wheat, late oats, spring beans, and buckwheat will still remain out. Late cut corn should be turned out and tied up in small sheaves and tightly bound.

*Potatoes* may be raised in dry weather, and where there is not ample space for spreading them abroad under cover they may be thoroughly dried upon the ground, and afterwards sorted. Seed potatoes are always better for being thus exposed for several days. Where the tubers are touched by disease a little quicklime scattered among the layers will arrest its progress.

Lattermath *Clover Seed* will be ready for cutting before the end of the month. This should never be carried until it is perfectly dry, and then the sooner it is housed the better.

*Mustard,* where grown for seed, will now be fit for cutting. In fine weather a few days' harvesting will be sufficient.

*Buckwheat* should be tied in small sheaves, thoroughly dried, but turned about as little as possible, and afterwards stacked in small round ricks or long and narrow ones. Some ventilation by means of hurdles or brushwood running through the stacks will be desirable, unless the corn has been very well harvested.

*Hemp* will be ripe in September, when it should be pulled, tied into bundles, and set up to dry. As soon as the seed is threshed out the stems are steeped in pools of water.

*Fruits,* such as apples and pears, may be gathered as they ripen, and stored in cool but airy places. Too much fresh air cannot be admitted. In packing for carriage, stow these as closely as possible without bruising.

*Hops.*—In Kent and Sussex, as well as in some parts of Worcestershire and Herefordshire, hopping will be the principal work of the month. No crop requires more careful watching and more energy in securing it when it approaches ripeness. Every care should be taken to pick free from leaves and mould, to keep them in the pokes as short a time as possible, to handle them carefully, to dry slowly and regularly, to bag warm, sew up tight, and store away in dry ceiled rooms. Fashions change, and the hop trade is a fickle one. At the present time colour takes precedence of quality: once it was not so. Hops bleached with the fumes of brimstone are of greater value in the Borough than those dried in a natural manner. The drying should as far as possible be effected by passing a rapid current of heated air through the hops, and not by means of the radiation of heat. Tight packing is one great essential to the proper keeping of hops.

*Steam cultivation* should now be continued uninterruptedly upon pea grattans, bean and oat stubbles, and wherever the land is foul and weeds have seeded. Here a good scarifying should precede ploughing, and thus the seeds of weeds will germinate and may afterwards be destroyed. Cart off at once or burn upon the land all couch and other weeds brought to the surface. In ploughing, lay up the winter furrows at an angle of 45°, and let the depth of furrow be from two-thirds to three-fourths its width, according to the crop intended to follow. Stir up deeply all newly-drained lands. Where steam is not available, make the best use of horses to forward the work of autumn cleaning and cultivation. Deep ploughing is especially necessary for potatoes, carrots, and root crops generally. Beans also like a deep though firm seed-bed. Now is the season to study and arrange the rotation of crops, so that the autumn cultivation may be adapted to these.

*Threshing* will upon most farms be confined to winter beans, oats, and tares—all of which will shortly be required for seeding. Where the corn is dry the drum of the machine should not be set too close lest it break up the seed. Stack and carefully thatch in the straw for winter use.

*Sowing.*—Rye, tares, winter barley, trifolium, and Italian rye-grass for soiling purposes should be got in as early as possible in the month, according to soil and situation. Upon cold clay lands both winter beans and winter oats should be drilled by the middle of this month to give them strength before winter.

*Live Stock.*—Horses being required late and early should have a fair allowance of oats with a liberal supply of green food. Foals should be weaned by the end of the month, and two-year-olds may have light work. Wether lambs may be sold off or forced for market, and barrens be put upon early turnips and cabbage, or have a few carted to them upon the pastures preparatory to folding. Fatting bullocks will now require a daily allowance of cake; linseed and cotton may be mixed in proportions varying according to the strength of the pastures and the season. Upon strong lattermath more cotton cake may be used, and upon short dry pastures a larger quantity of linseed. Put up large hogs to fatten. Store ewes may have the run of the stubbles for a time, and be put upon better keep before going to the ram. Rape is said greatly to increase their fecundity.

*Dairy produce*, both butter and cheese, will lessen in quantity as grass gets shorter. The cows' green food should now be supplemented with cake or corn. Their most abundant and nutritious keep will be found upon the lattermath.

*Poultry.*—The number of eggs will be greatly reduced as moulting takes place. A few cloves of garlic have been recommended, also an additional quantity of buckwheat, and a little cayenne pepper mixed with the wet food. Geese and turkeys should still range over the stubbles.

*Estate work*, as far as horse labour is concerned, should mainly be limited to those days when the horses cannot well get upon the land. Then they may be employed carting fuel for winter use, bricks and tiles for building, draining-pipes for the land, materials for roads and fencing, &c. B.

HEMLOCK BARK FOR TANNING.—The line between Baltimore and Sheffield, Pennsylvania, is through the picturesque scenery of the Alleghany Mountains, following the course of the beautiful Susquehanna River. Sheffield is situated on the line of the Philadelphia and Erie Railway, and is in the great hemlock timber region. The bark of these trees is extensively used for tanning, and the largest tanneries in America are in the vicinity of Sheffield. I visited one of the most extensive in this country—that of Messrs. Horton, Crary, and Co. They tan nearly 72,000 hides. Of these the principal portion are imported from South America. Their vats are filled with leather valued at £50,000, and each day 225 hides are placed in soak. Enormous quantities of the hemlock bark are used in the tanning, and it is estimated that 250,000 hemlock trees are cut down yearly to supply the necessary amount of bark. So extensive are the works, that these tanneries give employment to 1,300 men. Plank roads are constructed into the mountains to draw the bark over. They are often seven or eight miles in length, like long piers, and cost to build £200 per mile. They are essential to enable the bark to be drawn out of the forests at all seasons of the year, and some of the tanneries would have had to stop working last winter but for these plank roads. Fires in the mountains destroy an enormous quantity of valuable hemlock timber yearly.

ABIES (PICEA) SACHALINENSIS.—In describing some of the numerous interesting conifers introduced to this country from Japan, the *Gardener's Chronicle* says of this very handsome species of *Picea*, that it was found in the island of Jesso, near Sapporo, by Mr. Maries (n. 71), collector for Messrs. Veitch, in whose nursery at Combe Wood numerous young specimens are growing. The grace of the long linear leaves, and the elegance of the cones with their recurved serrulated bracts, render this a remarkable tree. It is stated to form a tall pyramidal tree, with stout branches covered with a brownish epiderm, covered in the young state with reddish fluffy tomentum, and marked with circular cicatrices and rather prominent elongated pulvini, which are dilated upwards.

*Weldon's Guide to Epping Forest.* By FREDERIC JOHNSON. *Third edition.* Price 6d. London: Weldon and Co., 9, Southampton Street, Strand.

In this handy little work we find a description of all the places of interest in and around Epping Forest, with directions how to reach them by road or rail; a concise account is also given of these historical woodlands from the earliest period up to the present. There is appended an excellent large coloured map, which clearly shows all the places referred to, and the Guide generally is of an interesting character.

## OUR FOREIGN EXCHANGES.

THERE have been received from Bohemia, *Haj*, No. 7; *Lovena*, No. 7; *Domacnost*, No. 7: from Austria, *Handelsblatt für Walderzeugnisse*, No. 27; *Oesterreichische Gartenlaube*, Nos. 21, 22, and 23; *Wiener Illustrirte Garten-Zeitung*, Nos. 5, 6, and 7: from Italy, *Nuova Rivista Forestale*, No. 4: from Spain, *Revista de Montes*, Nos. 83 and 84: from France, *Revue des Eaux et Forêts*, No. 7: from Denmark, *Tidsskrift for Skovbrug*, Vol. IV., Pts. i., ii., iii., and iv.; and by myself, a paper from a former number of the same, *Ueber die Bestimmung der Formzahl bei der Massentaxation*, von Herr Gyldenfeldt, *Jagdjunker zu* Kopenhagen.

In the *Revue des Eaux et Forêts* is the first of a series of papers on roads in mountain forests, by M. Guinier, in which, after sundry preliminary considerations, there are discussed what means of access and of transport are required to be created in such forests, the uses which these may serve, the technical designations given to the different forms of forest work, and a general view of the network of these required. And there is a paper by M. P. Madon, on a memoir by M. Gurnaud, on the influence of light, shade, and humus on the vegetation of trees in a forest.

In the *Revista de Montes* appears a paper read by S. D. Carlos Castle, forest engineer, at a Conference of Agriculturists held in May last, on the determination of agricultural regions; and a continuation of the treatise on the elements of forest taxation, or estimates formed of forest trees and forest vegetation, translated from the Italian by D. R. Alvarez Seriese, which among other subjects refers to that discussed in the paper by Herr Gyldenfeldt of Copenhagen.

In the *Rivista Forestale* is the conclusion of a series of papers on *Il Cansaiglio*, an inalienable forest domain of Venice, consisting of notes and matters connected with forest economy, the management followed from the sixteenth century onwards, the officials engaged in the administration and management, and the modern estimates of its vegetation and products, and of the products in pasturage, wood, and charcoal.

In the *Garten-Zeitung* are several reports on the prohibition of the transmission of vine stocks, plants and shrubs, lest thereby the *Phylloxera vastatrix*, which has proved so destructive to vines, should be more extensively diffused.

Certain precautionary measures were agreed to in an international convention between Austro-Hungary, Germany, Switzerland, France, Italy, Spain, and Portugal, in September, 1878; and in accordance with this the Government of Lower Austria issued, under date of 23rd March, 1880, a proclamation, in which it was declared—

1. That in certain communes specified, Klosterneuburg, &c., in which the Phylloxera had established itself, and in specified contiguous communes, Kievling and others, the sending out of the district of vine roots, vine cuttings, and vine stocks, which might possibly prove the means of transporting the insect itself, was absolutely forbidden, and not only these, but vine husks, manure, compost, and vine poles, or supports which had been used.

2. The sending out of other plants, shrubs, and like products from nurseries, gardens, forcing-houses, and orangeries, from the districts thus specified into any other of the Cis-Leithanian communes, or any state not included in the Berne International Convention, is only permitted when the owner of these products does so at his own charge and risk, with a certificate obtained from the district Government of his declaration that to the best of his knowledge they are in no way infested with the Phylloxera. And should the existence of the Phylloxera be indicated the infected articles must be burned. But the sending of even these into any of the states represented at the International Convention, or through any of these, is forbidden.

3. From Höflein, and other places specified, which lie near to the infested localities, the vegetable products included under both of the preceding sections may be sent, but not without a certificate obtained from the burgomaster of the commune, in which it is declared that the articles have not been sent from an infested district, nor have they been within the bounds of any such within the period of the preceding three months.

4. The traffic and commerce in wine, in grapes for the table without leaves or wood of the vine, grape-stoves, cut flowers, kitchen vegetables, seed of all kinds, and fruit, is everywhere perfectly free.

5. The sending of any of the articles specified in the first and second sections from non-infested districts in Lower Austria to any states included in the Convention, is subject to the Proclamation of 5th March, 1880.

6. Prescribes the penalties under which conformity to the requirements of the Proclamation will be enforced.

In a subsequent number reference is made to the interest taken by many horticultural associations in Austria and in Germany in discussing the expediency of imposing restrictions on the transport of garden products entirely free from earth; to the interest taken also in France in discussions on the expediency of imposing restrictions on the transport of vegetable products other than those of the vine; and in England in such discussions, and in discussions on the probability of the evil being spread by the discharge of ballasting earth conveyed in vessels sailing from infected districts, such, for example, as southern parts of France. And it is intimated that valuable information on all such subjects is embodied in the transactions of a conference of vine-growers, held in Vienna from the 22nd to 25th September, 1879, published by the *Landwirthschafts-Gesellschaft*, in Vienna, and attention is specially directed to the copious and detailed conclusions announced by the Ministerial-rath, Dr. Ritter v. Hamur.

JOHN C. BROWN.

EAGLEWOOD.—The Forest Report for British Burma for 1876-7 contains an interesting account of this singular product, the Akyaw of the Burmese and Kayugaru of Malays. It is obtained from the islands in the Mergui Archipelago, of which it is the only valuable article of forest produce. Akyaw has been described as consisting of "lumps of hardened scented resin found embedded in the trunk." But it is clear that this is not exactly the true state of the case, as the hardened masses are always composed of a basis of more or less decayed wood, the tissues of which are infiltrated with the resin. It is found in all parts of the trunk of the tree, and most frequently in the alburnum, but only where decay following intentional or accidental injury has attacked it. By artificially injuring the growing tree in a systematic manner the yield might probably be increased. It is generally believed to be produced by *Aquilaria agallochum*, Roxb., but the native collectors state that there are two kinds of trees which furnish the Akyaw, but that the substance from both is identical. The great bulk of that which is collected is sent to Penang and Singapore and shipped from thence to China, where small pieces are used for torches, incense, and medicine. In the islands of the Mergui Archipelago it is estimated that 8,000 trees are cut down every year, and the extermination of them in all readily accessible places is only a question of time.—*Kew Report.*

CUPRESSUS MACROCARPA.—This fine cypress flourishes near the sea, and nowhere have we seen it to greater advantage than at Eastbourne. It may not be able to bear the full blast of the south-west winds close to the sea like tamarisk, but it does well in most of the gardens in the town. Many specimens have attained a considerable size, and assume the habit of a cedar—a characteristic of this species in an adult state. Talking of tamarisk, we saw one ancient example against the gable of a house facing the sea, the trunk of which must be nearly, or quite, a foot in diameter, and the height nearly 30 feet. Tamarisk is, we may mention, very effectively employed in the same town on the steep slopes of the parade fronting the sea. It is cut down annually, and the young growth makes a fine bank of green in summer, extending from the pier to the Wish Tower. Here and there, at the back of the concrete seat, which extends from one end to the other of the parade, the tamarisk has been left, and trained over, in order to provide a little shade.—*Gardener's Chronicle.*

## LARGE ELMS DYING OFF SUDDENLY.

THE following interesting correspondence has been placed in our hands by the parties concerned, and as it may afford a word of warning to those who have valued trees in a state verging on extinction through neglect or decay, we place it before our readers:—

"One of the two large elms in the oat-field has undergone such a remarkable change in the last two or three days that I should like you to come and see it. All its leaves have turned a pale yellow, and they have assumed the tint such as they would have at the end of October or the beginning of November; the change must have been very rapid, for it is only this morning that my attention was drawn to it, the effect being quite startling. You may probably be able to give a reason for the apparent phenomenon. W. P.

"*4th August*, 1880."

"The elm is now entirely stripped of its leaf, and is apparently dead. It appears to me that its decease is attributable to the woodlouse; there are several perforations in the bark, which is easily removed from the stem, the wood being quite dry. Upon removing a portion of the bark I found vast numbers of woodlice and any quantity of their eggs; this state of things will be found to exist all round the tree, the sap is therefore prevented from rising, and the tree has perished. I regret it greatly, for I can ill afford to spare the tree. I am anxious about the others, for the same thing may happen to them. Pray bring your valuable knowledge of arboriculture to bear up on the matter, and relieve my anxiety.

"*8th August*, 1880. W. P."

"I have examined the elm tree to which you refer, and find it has been decaying for several years. The woodlice have *not* been the cause of the decay, but have infested the tree *since* its vigour has been impaired. The perforations in the bark have been caused by earwigs which have taken possession of the part of the tree where decay first began, and from which the natural sap of the tree has been expelled. You are right in supposing that the tree has perished by reason of the sap being prevented from rising in the stem, but this decay has been a very gradual one, and has taken several years to result in the death of the tree. The abortive attempt to renew its vigour was a last effort of Nature to reassert her sway; and this effort was frustrated by the diminished flow of sap, which was insufficient to supply the evaporation from the leaves, which consequently assumed their autumn tint. The other elms in the same neighbourhood are in perfect health and vigour, and are not likely to die suddenly. If at any time a large tree for which you have special veneration shows symptoms of decay, you may renovate its enfeebled vigour by washing it well with a *scrubbing-brush and soft soap*, and afterwards applying a top-dressing to the roots of good rich soil or vegetable earth.

"*18th August*, 1880. A. P."

**Appointments.**—Mr. Alex. Johnston, foreman forester, Scone, is appointed head forester to the Earl of Kenmare, at Killarney, Ireland.—Mr. Alex. Whillis, assistant forester, Scone, is appointed as forester and land steward on the estate of Faskally Pittochny, Perthshire.

**Rhododendron Ferrugineum.**—We have never seen this species so fine as we met with it the other day in the charming grounds at Bagshot Park. Low spreading bushes of it dotted here and there among huge masses of other rhododendrons, kalmias, &c., produced a fine effect when covered with its deep rosy-pink flowers, and attracted the admiration of everyone. Such subjects as these tend greatly to relieve the somewhat monotonous appearance of masses of common rhododendrons. All kinds of the so-called American plants of course thrive in a remarkable degree on the peaty Bagshot soil, and such immense specimens of rhododendrons and kalmias as exist on the lawns at the above place are seldom met with, and are in themselves quite a distinct feature in the place, though most of them represent the older kinds. Surrounding the newly-built mansion, however, are some extensive groups representing most of the leading varieties recently transplanted from the neighbouring nurseries of Mr. John Waterer. When these become established and of large size they will form a beautiful feature in the immediate surroundings of the mansion, and even as they are in flower now they produce a fine effect.—*Garden.*

**Death of a Saxon Forest Officer.**—Karl Rudorf, one of the chief officials in the Saxon Forest Department, died on July 19, aged fifty-six. He was trained at Tharand, and achieved at the outset of his career so high a reputation that he was promoted with singular rapidity. He held the first rank in his profession, not only in Saxony, but also throughout Bohemia and Prussia ; and young men who purposed devoting themselves to forestry sought eagerly to serve under him. Only last winter the Alsatian Government selected for their own forest department several candidates who had been trained under Rudorf.

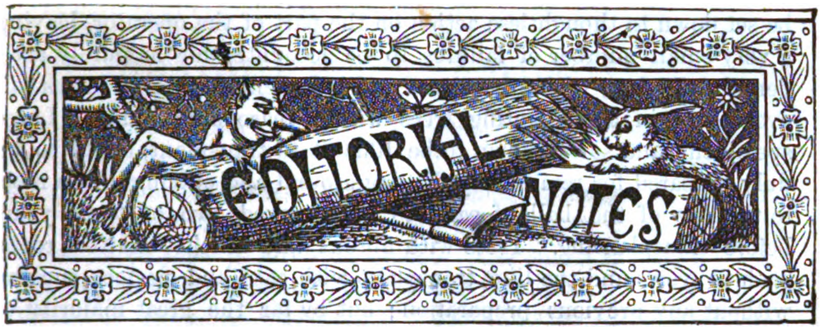
**Obituary.**—We regret to announce the accidental death, on the 24th ult., of Mr. James S. Suttie, agent to Sir John Honywood, Bart., of Evington Place, Ashford, Kent. The deceased was driving to a place called Elmsted, where he resided, on Monday night, and when on a lonely part of the road the seat of the cart shifted, and he was thrown to the ground, falling heavily on his head. The horse went on, and was stopped near the residence of the deceased late at night. Search was then made, but the unfortunate gentleman was not found until the following morning, when he was discovered in an almost unconscious state by the side of the road at the spot where he was thrown out. Mr. Suttie was removed to Wye, the nearest village, and lingered until Tuesday night, when he succumbed to concussion of the brain. Mr. Suttie was fifty-eight years of age, and he had acted for the Honywood family for many years. An inquest was held on the following day, at which a verdict of "accidental death" was returned.

THE GRUB OF THE COCKCHAFER IN GERMANY.—In the *Monatsschrift*, &c., for March of the current year is a short article on this subject, from which it would seem that the grub of the cockchafer or May-bug is sometimes as destructive in Germany as in France. It breeds in enormous quantities in certain places, and if its existence is not early discovered it clears everything before it. The author of the article in question, M. Ronnenkamp, superintendent of the city gardens of Berlin, relates that he has experienced four recurrences of this plague. In one case the rich and valuable stock of a nursery was annihilated, and the owner parted from his land an impoverished man. Last summer these grubs appeared in astonishing numbers in the public garden called the Humboldtshain. It is computed that no less than 40,000,000 of them were collected from a piece of turf less than fifteen acres in extent. The only effectual method of dealing with them was to collect and destroy. Various other means were tried, with very little success. Even moles will not eat them if they can get worms. Fluid applications only drove them to a greater depth, to return again, and many things that will kill the grubs leave the ground in an unfit state for vegetation. They ate away the roots of the turf, that the latter could be rolled up as if it had been cut in the ordinary way.

PYRUS CORONARIA.—Mr. Lynch sends us from the Cambridge Botanic Garden flowering specimens of this low tree, commonly called in America the American Crab. It occurs from the region of Lake Superior to Louisiana, and is especially abundant in some of the higher parts of the Alleghany Mountains. It bears large and handsome flowers, pale rose, with a delicious violet scent. Its merits as a flowering tree seem to us to be very little known.—*Garden.*

HOW TO DESTROY WASPS.—During the recent visit of the Members of the Scottish Arboricultural Society to King's Meadows, Peeblesshire, the attention of the visitor's was drawn to the unusual abundance of wasps' nests, or "bikes" as they are called in Scotland, and the extraordinary size of some of them. In the course of conversation upon the subject, it was stated by Mr. MacFarlane, the Gardener at King's Meadows, that he had destroyed no less than thirty-one "bikes" during the two preceding days, by the application of a few drops of Cyanide of Potassium to the mouth of the "bike" or nest. Mr. MacKinnon, of Melville Castle, mentioned that he had destroyed the wasps of above 160 nests, by the same means, this season, and corroborated Mr. MacFarlane as to the efficiency of the cure; the proper mixture being 4oz. of the Cyanide of Potassium to one quart of soft water. The Cyanide should be first dissolved in about half-a-pint of milk-warm water, then pour it into a quart bottle, and fill up the bottle with soft water. Shake the mixture well, and keep the bottle closely corked. To apply it, pour a few drops on to a small bit of rag or cotton wool, and insert it into the mouth of the nest with a small stick, pressing it down so as to leave an opening for the wasps to enter. After a few trials the operation is easily and expertly performed, and it is said to be certain destruction to the wasps. The mixture must be handled with great caution, as it is a deadly poison, and it should not be left in the way of children or careless people. The cost is a mere trifle; one shilling's worth being considered ample for the destruction of 100 wasps' nests.

PRESENTATION.—On his retirement from the post of factor and commissioner on Lord Macdonald's Skye estates, the tenantry have presented a suitable testimonial to Mr. Macdonald of Tormore.



SINCE it has become fashionable to plant ornamental grounds for "immediate effect," the month of October is the busiest in the year with the planter. Now is the time when he can transplant his finest and largest specimens with the greatest certainty of success. With due care, and the necessary appliances, there is hardly a limit to the size of the trees he may safely transplant, or to the distance they may be removed. It may be said that under these conditions trees may be transplanted with perfect safety at any period of the year. True enough; but at no other season can they be removed with so little risk of failure, and consequently at less cost, since at no time have less labour and attention to be bestowed upon them afterwards to ensure success.

The reason for this is, the trees have now made their growth for the season, and have matured it sufficiently, so as to be able to withstand the rough treatment which it must unavoidably submit to while the trees are being lifted and transplanted; while at the same time the roots are still in a state of activity, and able to immediately "lay hold of the earth" in their new site. The warmth still in the earth and the genial autumnal weather all exercise a beneficial influence in promoting a vigorous action between the root and the top of the tree, and the whole system gets into healthy working order under the most favourable conditions. It is thus that the trees arrive at a proper state of maturity, to successfully brave the rigours of the winter by the time the cold weather sets in, and are in the best possible condition to start into growth when the approach of spring calls forth plant life to renewed action.

At every other period of the year the energies of the transplant are more liable to be severely drawn upon by heat, drought, cold, or storm, and more care is required to protect it against their exhausting and often fatal influences. Half the losses in transplanting may fairly be ascribed to these evil influences, when care is not taken to effectually counteract them. Nearly the other half of the losses may be set down to thoughtless action on the part of the operator, leaving a very small number of failures to be accounted for as purely accidental. In fact, with proper care and judgment, few or no losses will ever occur in transplanting trees within reasonable limits. Large specimens, and sorts known to be difficult to transplant, ought to be duly prepared for removal by digging around and cutting in the roots to the size of the ball of earth to be removed, two or three years before transplanting. Trees with fibrous and thickly matted roots, such as yews and the like, transplant with ease and perfect success, without any previous preparation; but by far the great majority of trees, when of any size, can only be transplanted with certain safety when careful preparation has been duly made for their removal. Hence the necessity for seizing the opportunity to do so at the most favourable season of the year, which is from the middle of September to the middle of November, commencing with evergreens, and finishing both evergreen and deciduous planting by the end of this period if possible.

But it is not alone to ornamental planting, or the transplanting of large trees, that this season of success is applicable. In nearly every instance of forest tree planting the work can be better and more expeditiously performed in the autumn than in either the winter or the spring, and by doing so the losses from everything but game are reduced to a minimum. Still the dilatory and less successful practice of winter and spring planting generally prevails in most parts of the country, and often in circumstances where no excuse can be made for neglecting to plant in the autumn—the most economical as well as the most favourable season for the operation. As knowledge spreads, and the principles of plant life are better understood among those in charge of forests and plantations, autumn planting will be more generally adopted, with much saving to the landowner, and more success and credit to the skilful operator.

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On Tuesday, 5th inst., the Annual General Meeting of the Scottish Arboricultural Society will be held in the Royal Botanic Gardens at Edinburgh, when business of much importance to all interested in forestry will be brought before it. From the published programme now before us we observe that the chair is to be occupied by the distinguished arborist, Robert Hutchison, Esq., of Carlowrie, senior Vice-President of the Society, who is to open the meeting by some remarks of an appropriate nature. Of the various items announced in the course of the usual business, the Reports of the Judges on the Competitive Essays is always looked forward to by all with much interest, and with nervous anxiety by some who may be making their first literary effort, and have not yet learned to await with stoical calmness the fiat of the judges. There is a goodly number of essays in competition this year, some of them treating upon subjects of great importance, such as the "Comparative value of timber as affected by altitude and situation;" a recently adopted "System of oak coppice management;" "the Larch bug, its origin and prevention;" the "Cause of the deterioration of spruce plantations during the past three years;" the "Cause of disease on beech hedges;" the "Rearing and management of hardwood plantations;" the various "Modes of enclosing plantations;" and the "Degeneracy of larch timber." Upon each of these subjects an essay may be produced of great value to the practical forester, whom we hope they will assist in some degree to clear up a few of the obscure and knotty points of his profession, and enable him the better to understand the nature of the subjects with which he has to deal, and the treatment required to keep them in a healthy and vigorous condition.

Among other "Reports," that drawn up by the Committee on the "Education of Young Foresters" will attract more than ordinary attention, seeing that it is a subject upon which it is full time that the Society had come to a definite conclusion; and having sketched out an educational programme for young foresters, it should use its means and influence in carrying out the scheme of which it approves in the completest manner possible. This is a matter upon which the Society has immense influence, and we trust to see it using its power with energy and decision in effecting a thorough reform in the education and training of foresters, which at present is perfectly disgraceful to the intelligence and enterprise of the country. In connection with the educational subject, it is to be hoped that the Committee appointed to inquire into obtaining a Royal Charter for the Society will have a favourable report to submit to the meeting. It is of the utmost importance to the Society that it should be incorporated by Royal Charter, and no effort should be spared to accomplish that object at the earliest possible date.

The very important subject of "The Deterioration of Larch and Spruce in this country" has been selected for discussion at the meeting, and in these times, when the subject is attracting so much attention throughout the country, no more interesting subject could have been chosen. It is certain to afford room for much critical remark, and perhaps wide divergence of opinion, but the information which is sure to be elicited can hardly fail to be of an instructive and deeply interesting nature. The untoward climate of recent seasons has had considerable influence in producing weak and immatured growth, with a tendency to disease and premature decay, in many branches of the vegetable kingdom; and while the results can still be seen, or remembered, a discussion upon their nature and effect may be conducted under conditions highly favourable to a clear exposition of facts.

At the early hour of ten a.m., on the 5th, it is announced that a trial is to be made of the two-horse Hedge-Cutting Machine, invented by Messrs. Richard Hornsby & Sons, of Grantham, and which was illustrated at page 142 of our last year's volume, and described on page 141 shortly, as follows:—"The machine is mounted on two road wheels of large diameter, to secure light draught. Both wheels are employed in driving the working parts, the motion being communicated by an arrangement of gearing to one of a pair of knives, similar to the knives of mowers and reapers, but larger and of greater strength. These knives are carried by a sliding bar projecting from the side of the machine. This bar with the cutting apparatus is so arranged as to be capable of ready adjustment to suit different circumstances, the entire machine, when set for work, being under complete control of the man in charge, who rides upon a seat conveniently placed for making all necessary adjustments. The cutting apparatus can be raised to any required height, to suit high or low hedges, or the level of the ground on which the machine may be travelling. It can also be set at any required angle, to cut more or less off the hedge, and to reduce its height or alter its shape as may be desired." The trial is to be made on the farm of East Pilton, about a mile from the Royal Botanic Gardens, and it will be certain to form a very attractive feature in the day's proceedings to all who are interested in the management of live fences.

On Wednesday, 6th October, an excursion of the members to Hopetoun has been arranged, when the splendid demesne and extensive woods of the Earl of Hopetoun will be visited. These comprise some of the richest landscape and most beautiful park scenery to be met with in the Lothians, and the extensive woods and plantations are celebrated for the excellence of their management, and the fine trees and large crops of timber produced in them, so that the visitors with true arboricultural tastes may expect to enjoy a rare treat, and an excellent opportunity to add to their store of practical knowledge.

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WE are informed that the Managing Committee have arranged that the Testimonial to Mr. McCorquodale, of Scone, will be presented to him at the Annual Dinner of the Members of the Scottish Arboricultural Society, on the evening of the General Meeting at Edinburgh, on the 5th inst., at which it is expected a large gathering of his friends will be present.

THE rich and varied shades of autumnal foliage are now appearing around us, giving warning of the near approach of winter, but in the meantime presenting to the eye one of the most pleasing and attractive phases of nature. Scarcely a leaf, and not a tree, but what varies in colouring, and harmoniously contrasts with the tints of the surrounding foliage. It is now that the aspect of nature can be studied with most advantage by the planter, with a view to learn the best combination of trees for producing the most pleasing effect on the landscape. The matured and mellow outline of each tree is now fully developed, and its foliage, habit, and contour are exhibited in their most perfect form. The dark, stately, towering forms of the fir tribe contrast sharply with the light-coloured, sturdy, branching forms of deciduous trees; and the golden pyramidal outline of the lime standing singly on the deep green-sward of an ancestral park presents one of the most charming objects which can delight the eye and add grace and beauty to the scene.

The season which is drawing to a close has, on the whole, been favourable to the development of wood and foliage, which the autumn has brought to a high state of perfection. The wood of the season appears to be well ripened, and the deciduous leafage, which is very abundant, is large and full, and retaining its vigour later than usual. Its rapid change from dark green to the mellow shades of autumn indicates a vigorous maturity; and as the leaves change their colour under such propitious circumstances, they assume the richer and deeper tints which are the glory of autumn woodlands. These will be observed in their fullest beauty and perfection during the present month, when the keen arborist and landscape planter will not fail to mark their distinctive beauties and lovely contrasts with an admiring eye, and a critical taste to reap the benefit of the richness of the scene which nature so lavishly spreads before us.

A SERIES of articles have appeared during the past six months in the *Perthshire Constitutional and Journal*, an ably conducted provincial paper published in Perth, on the "Woods and Forests of Perthshire;" and as the articles have only extended to the woods and forests on some half-dozen of the numerous well-wooded estates in that extensive county, the readers of the paper have still to look forward to a long continuation of these interesting descriptions of woods, forests, and remarkable trees. Nor is the subject of interest to local readers only, as the articles are written in a style that makes them attractive reading to those who never saw either Perthshire or its large and well-managed woods and forests, and the writer has evidently taken up the subject with an innate enthusiasm which no amount of hard work and difficult research can cool or in the least tire out. The history of the woods and forests from the earliest dates to the present time is carefully traced out, and recorded in graphically entertaining style; while the present state and management of the various woods and plantations are described in an intelligent and instructive manner, which renders the account of them a valuable record for reference at any future time. The old and remarkable trees growing upon the various estates are also carefully noted, and many of the descriptions give the measurements and details of the most remarkable trees, which adds greatly to their interest in the eye of the arborist. We hope the articles will be continued in the manner in which they have been so well begun, until the woods and plantations on every estate in the county are described, and the site, history and condition of every notable tree is accurately recorded. Indeed, the articles contain the material for a most interesting and instructive book, in which shape we hope the author will be induced to re-publish them, as they would be highly appreciated in such a form by a wide circle of readers interested in Forestry, but who cannot easily find time to refer to them among the files of a newspaper. Among the woods and forests, and notable trees, described in the score of articles which have already appeared are those on the estates of Athole, Dunsinane, Moncrieff, Murthly, and Scone. We could wish to see the "woods and forests" of every county in the United Kingdom treated in the same able and exhaustive manner.

TREE PLANTING IN IOWA, U.S.—The extent of tree planting in Iowa must be considerable, as is shown by the amount of the exemption from assessment for taxation. Section 796 of the code of 1877, in accordance with a law passed by the twelfth general assembly, provides that for every acre of forest trees planted and cultivated for timber within this State, the trees therein not being more than twelve feet apart and kept in a healthy condition, the sum of 100 dols. shall be exempted from taxation upon the owner's assessment for ten years after each acre is so planted. For every acre of fruit-trees planted and suitably cultivated within the State, the trees therein not being more than 33 feet apart and kept in a healthy condition, the sum of 50 dols. shall be exempted from taxation upon the owner's assessment for five years after each acre is planted; such exemption shall be made by the assessor at the time of the annual assessment, upon satisfactory proof that the party claiming the same has complied with this section; and the assessor shall return to the board of equalization the name of each person claiming exemption, the quantity of lands planted to timber or fruit-trees, and the amount deducted from the valuation of his property. The last session of the general assembly amended this somewhat, so as to provide the amount so deducted should not exceed one-half of the valuation of the realty on which such exemption is claimed. This amendment cuts down the exemption from taxes by tree planting somewhat, although it still amounts to about 3,000,000 dols.

# Steam Cultivation.

By ALFRED J. BURROWS, Land Steward, Pluckley, Kent.

*(Continued from page 289.)*

After watching for many years the results of trials of various kinds of steam cultivating machinery, I have come to the conclusion that for use upon moderate-sized estates, where very heavy work is not contemplated, nothing surpasses in simplicity of construction, easy working, efficiency, and general economy, the tackle of Messrs. Fisken and Co., of Leeds. The low price of the machinery, the speed obtainable, the lightness of draught and consequent small quantity of coal used, and the advantages of the self-moving windlasses, combine to recommend it. Here a Clayton and Shuttleworth's engine of 10-horse power, which is also used upon the estate for sawing timber and for general joinery purposes, as well as for grinding corn and cutting chaff, is fitted up with a grooved outrigger, bolted on to the fly-wheel for carrying the manilla hemp rope which drives the machinery. A light 3-furrow plough turns over an average of five acres of land per day, and ploughs any required depth. A 5-tined cultivator, simple in its construction, and therefore very easily managed, thoroughly stirs about ten acres per day, and a pair of heavy drags attached to this completes the operation.

Mr. G. A. Dean, Referee to the Board of Trade, and a high authority on matters connected with agricultural engineering, says, "As regards rope traction, I am of opinion that the best mode of conveying the power from a steam engine to a point at which it has to be exerted for hauling ploughs, is by means of a light rope and windlass, after Fisken's principle. Mr. Fisken states that sixpence per acre is sufficient to renew his rope when worn out. If this be a correct estimate—and I have no reason for doubting the accuracy of it—then I prefer the Fisken apparatus to any other known. One great advantage of Fisken's round-about system, as it is generally designated, is that a field may be ploughed with an engine half a mile off."

The objection which Mr. Dean raises as to the grooving of the fly-wheel to receive the manilla rope is now entirely surmounted by the use of an outrigger, costing about forty shillings, and which can be bolted on to the side of the fly-wheel or removed at pleasure.

A short description of this machinery, as worked upon the Home

Farm of Sir Edward C. Dering, Bart., at Pluckley, with illustrations, may be acceptable to many readers of the *Journal*, and prove a guide to intending purchasers of steam cultivating apparatus, either for farm works or for the preparation of land for tree-planting.

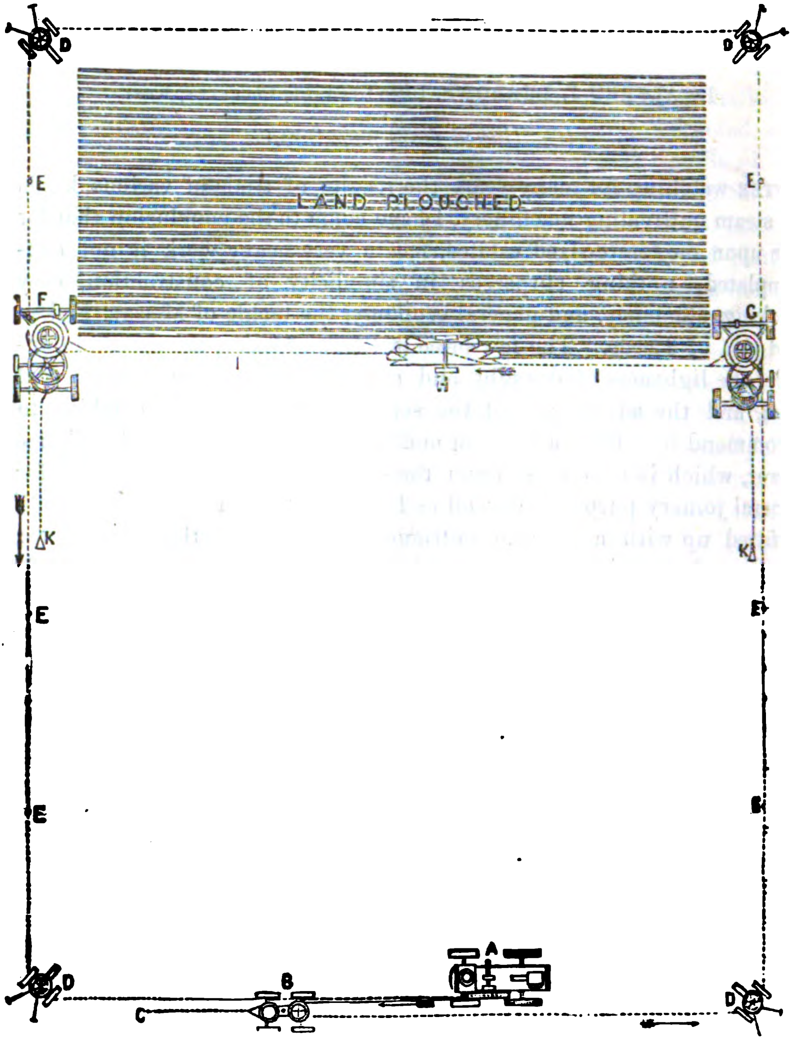


FIG. I.

Fig. I. represents a general plan of the working of the machinery at present in use here. The engine supplying the power is placed at A, but it need not necessarily be in the field; it can be stationed at any point where coals and water are most easily obtainable. An endless manilla hemp rope, shown by dotted lines, passes round either the grooved fly-wheel of the engine or the outrigger attached to it, and thence round the tension pulley, B, which is separately illustrated in Fig. IV., anchored at the point C, and the use of which is to adjust the tightness of the rope. On leaving the tension pulley, B, the rope is carried round the corner anchor pulleys, D D D D, an illustration of one of which is supplied by Fig. III., and the intermediate porter pulleys, E E; and finally, after encircling the field to be ploughed, it returns to the fly-wheel of the engine.

The outline of the field need not necessarily be rectangular, as the rope can by means of the corner anchors and pulleys be carried round an angle of any kind without notably affecting its working.

F and G are two windlasses, shown in Fig. V., between which the plough traverses, and H is the plough itself. The manilla driving-rope passes round a horizontal grooved pulley, keyed to the upper end of the upright shaft of the windlass. On the lower end of the shaft is fixed friction clutch gearing, so arranged that it can be readily thrown out of gear, so that the endless rope may be driven without communicating its motion to the lower barrel of the windlass, round which is coiled the strong wire rope, I I, which drags the plough.

The engine on being started propels the endless rope at a velocity of about twenty-two miles per hour. Suppose the plough is required to commence its work at the windlass G, the windlass F is thrown into gear, and immediately coils up on its barrel the wire rope attached to the plough, which is at the same time given off by the windlass G, at the easy rate of about two miles per hour, dragging the plough across the field from G to F. The windlass is thrown out of gear whenever the plough reaches F. The plough is then reset for another furrow—an operation which in ordinary working occupies less than half a minute; the two windlasses are moved forward a few feet by machinery worked by the endless rope winding up a steel rope anchored at K, and the opposite windlass G being then thrown in gear, the plough is drawn slowly back to its starting-point. The engine, therefore, never requires to reverse or stop its motion, and the endless rope is continually running. The action of the windlass in starting and stopping the plough, and its consequent reciprocatory action, being entirely under the control of the attendants, the work goes on without the necessity of any signals between the man guiding the plough and the man at the engine. The advantages of this arrangement are very important, enabling the implement to be turned at the headlands very quickly, saving much of the time usually lost in that operation; and should the implement come against a land-fast stone, or other impediment, it can be stopped at once.

An important point connected with this system, and one upon which great stress is laid by Messrs. Fisken and Co., is that only about an eleventh part of the strain of the plough is borne by the manilla rope. A single rope is stated to be capable of ploughing 1,600 acres of land, in which case the cost per acre would be about threepence. But much depends upon the care taken of the rope and the general system of cultivation.

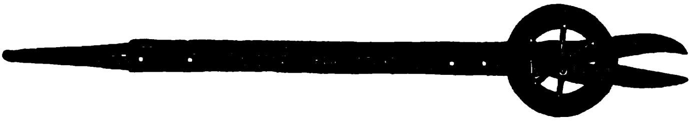


FIG. II.

Fig. II. shows the light rope porter, which serves both as a support and a guide to the driving rope. The shaft of this is of wood, with a long sharp iron prong for fixing it in the ground. The upper end carries two cheeks or brackets, and between these is a grooved pulley. The cheeks are so constructed as to prevent the rope from running off the pulley; but should the porter fall, it is at once cast free of the rope without danger either to the machinery or to the men at the windlasses. This is provided for by a joint in one of the cheeks, and by means of this joint the part can be folded down so as to enable the pulley to be withdrawn from one spot and put down in another while the machinery is running. The position of the rope porters is indicated by E E, in Fig. I.

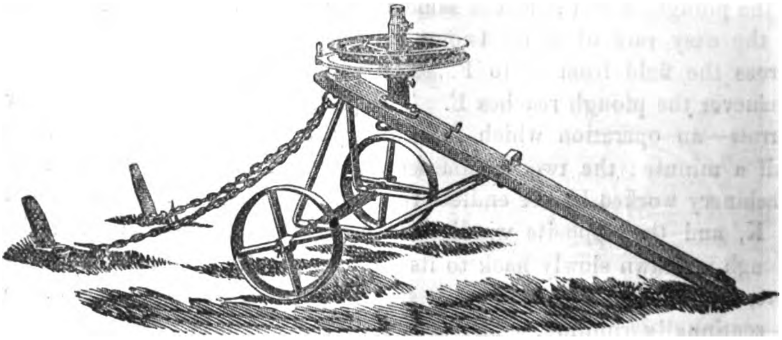


FIG. III.

Fig. III. shows the construction of the corner anchor and the method of fixing it. Its use is to guide the manilla rope round the corners of the field, and by the aid of several of these a field of any form may be cultivated to within a few yards of its boundaries. The corner anchors are kept in position by means of short chains attached to iron bars or stakes driven firmly into the ground. They are shown at D D in Fig. I.

Fig. IV. affords an illustration of the construction of the tension anchor, which consists of a strong frame on four wheels, with a grooved

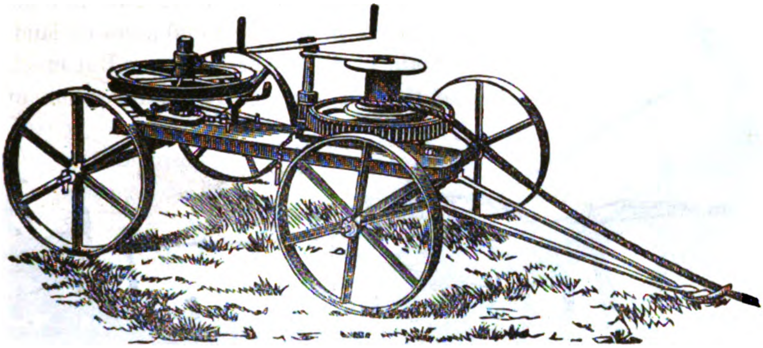


FIG. IV.

pulley upon its top, round which the endless manilla rope passes. It has also a drum worked by a wheel and pinion. This drum carries a short length of rope, one end of which is secured to it, and the other to a stake in front, marked C. By turning the pinion so as to coil the rope round the drum the anchor can be drawn forward so as to produce the proper tension upon the driving rope, as shown at B in Fig. I.

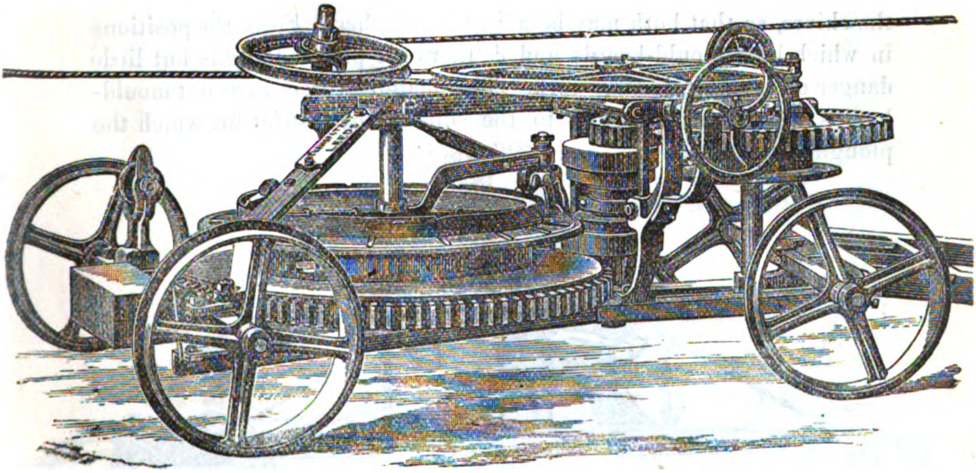


FIG. V.

Fig. V. represents the anchor windlass to which the driving rope comes from the engine, and is guided into the groove of the large horizontal pulley by the small guide pulley which is placed in a slanting position for this purpose. The steel rope which draws the implement —whether plough, scarifier, or harrows—is wound up by the lower drum, and the rope for drawing the windlasses along the headland is wound up by the small drum on the right-hand side. The position of these windlasses in working is shown by G and F in Fig. I.

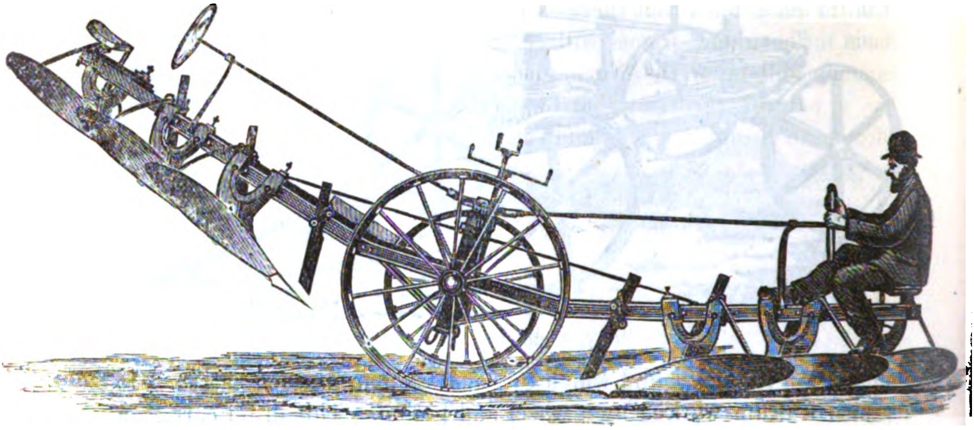


FIG. VI.

Fig. VI. is Fisken's Patent Balance Plough, which may be had from the manufacturers to turn over from two to six furrows. They are constructed with very strong frames, so that there is no danger of twisting in the stiffest soils, and the mould-board stays are attached to the skives, so that both may be adjusted together. From the positions in which both mould-boards and coulters are placed there is but little danger of choking during work. The manufacturers turn out mould-boards of any pattern suited to the soil of the district for which the plough is intended.

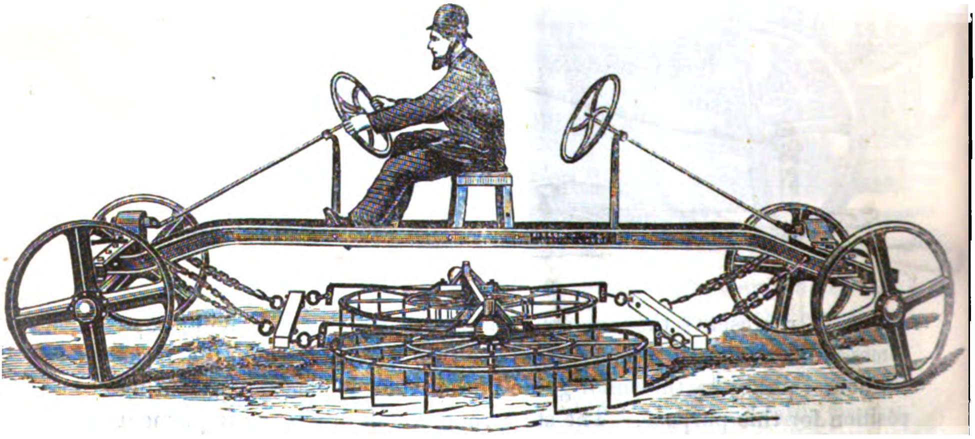
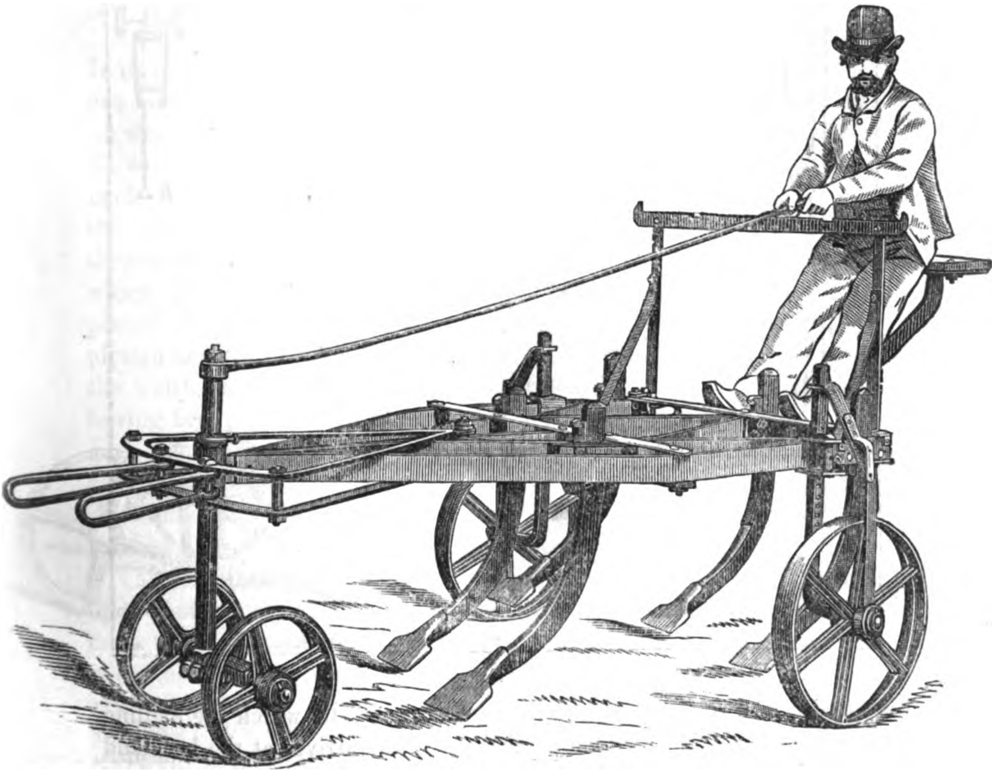


FIG. VII.

Fig. VII. shows the steam harrow upon a wrought-iron frame of about 12 feet in length, mounted on four travelling wheels, and fitted up with steering gear. The hauling ropes are attached to each end as with the plough, so that there is no necessity for turning at the headlands. The same frame will carry either harrows, clod-crushers, common rollers, or the Norwegian harrows. As illustrated above, it has a pair of revolving harrows attached. These are wonderfully effective in bringing weeds and couch-grass to the surface of the land. In working here we ordinarily attach a pair of common harrows to the cultivator, or even to the plough, and with an extra hand to swing these round at the ends the two operations are usually performed at one stroke.

During the present year Messrs. Fisken have brought out and patented a new set of steam ploughing tackle, which is, both by its lightness and cheapness, more especially adapted to smaller holdings of a few hundred acres in extent. The price of a complete set of this, including rope, three-furrow plough, and everything except the engine necessary for its efficient working, is £200. One great advantage of this set is that it requires only three persons to work it, viz., an engine-driver, a ploughman, and a porter boy. The small outlay required places this set within the reach of many who have hitherto



been debarred from the use of the steam plough, either by the cost of the machinery itself, or the great expense and uncertainty of hiring it. This set also does away, to a great extent, with the wear occasioned by the constant trailing of a steel rope along the ground.

Fig. VIII. illustrates the five-tined turning cultivator, consisting of a strong wrought-iron frame, carried upon four wheels, the two front ones also being used for steerage purposes. The forepart of the frame

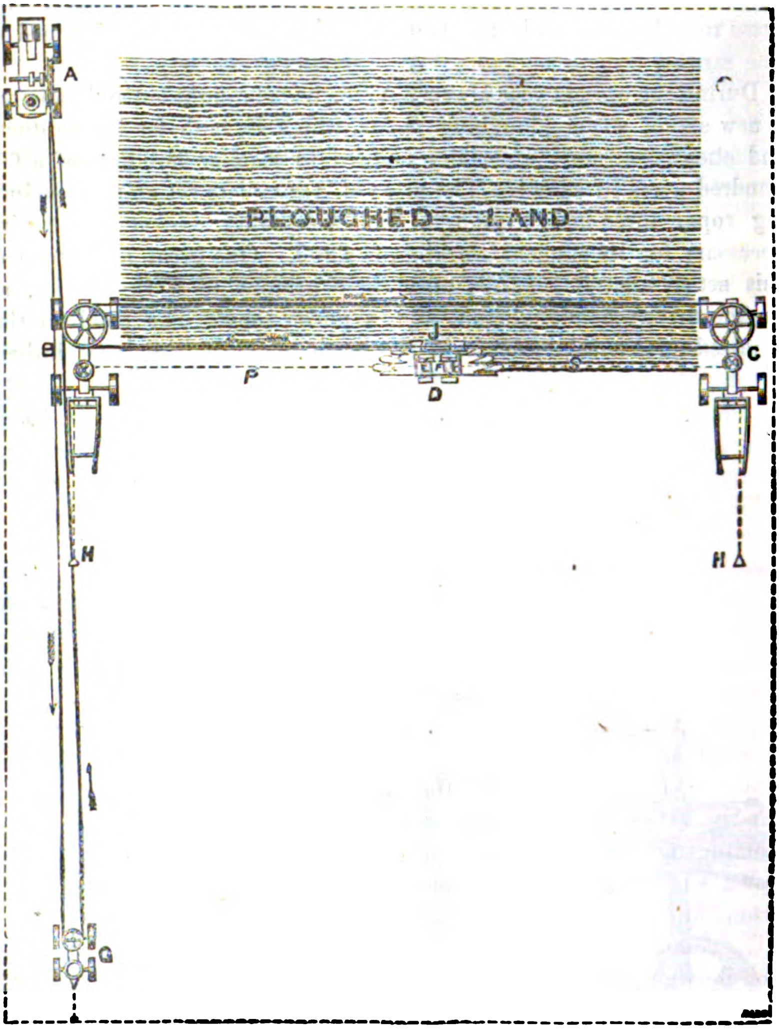


FIG. IX.

is fitted up with a turning bow with two ears, to which the hauling ropes are attached. As soon as the cultivator arrives at the headland the windlass on the opposite headland commences to wind up the steel rope upon the drum; the action of this rope causes the two front wheels to be lifted from the ground, bringing up also the front tines of the implement, and at the same time it pulls the cultivator round. The tines again enter the ground, and the man upon the seat so adapts the steerage as to work the cultivator through a fresh breadth of land. The tines are supplied of various breadths, adapted either for broadsharing, scarifying, or deep stirring.

An illustration of the general plan of working this new machinery is given in Fig. IX. The engine A is placed at the end of the headland, and the tension anchor G at the opposite end. The endless manilla rope, the direction of which is shown by the arrows, passes from the fly-wheel of the engine along the headland, round the tension anchor pulley, and then back along the headland until it reaches the anchor B, when it takes a bend round the grooved pulley on the anchor, and passes down the field and round the grooved pulley on the anchor C, afterwards going back up the field. In doing so it takes a half-turn round the grooved pulley on the combined windlass-plough D, and passing round the grooved pulley on the anchor B, goes again on to the fly-wheel of the engine. The plough used is the ordinary balance plough, with its centre frame somewhat stronger.

An illustration of the combined windlass-plough is given in Fig. X. In its centre frame are mounted two drums, as shown in the figure, which can be geared at pleasure into a pinion on a shaft, on the outside end of which is the grooved pulley round which the manilla rope passes. To each of the drums is attached a wire rope, the opposite ends being made fast to the anchors B and C. On wishing to commence work the manilla rope is put in motion by the engine; the ploughman throws into gear one of the drums on the combined windlass-plough, which, as the other end of the rope is fast to the anchor, hauls the plough down the field. When it arrives at the opposite headland the ploughman throws the drum out of gear, winds the anchor forward the width of the plough by means of the self-moving windlasses, and having brought to the ground the other end of the plough, throws into gear the other drum, and the windlass-plough is thus hauled back again up the field. The method by which this motion of the plough is effected is very ingenious, and well deserving the attention of all persons interested in the perfecting of agricultural machinery.

The combined windlass-plough weighs about 35 cwt. It is carried upon four strong wheels. The anchors used in this system are little more than a bottom frame, also upon four wheels, which is fitted up with the ordinary winding-forward drum and a shaft to carry the grooved pulley for the manilla rope. The weight of one of these is about 16 cwt. The porters are mounted on wheels, and are moved by a porter boy in the ordinary way.

A glance at Figs. I. and IX. will at once show the advantages of the latter system. By working only round the large wheel of the anchor, the length of rope required is very considerably less than that of the old system. And by being able to dispense with two out of the five hands formerly required, a great saving is effected.

In the former article upon steam cultivation, sufficient was said to show both its advantages and its desirability upon all holdings of any great extent, and more especially upon heavy soils, where the impossibility of a thorough winter or early spring cultivation with horses renders it doubly necessary that every opportunity be taken to make all possible progress in the autumn.

Still further to illustrate its great advantages, I may here quote Mr. Smith, of Woolston, who in writing upon the subject a few years ago says:—"After finishing my harvest on September 18, and completing my thatching, as well as dunging 78 acres of wheat stubble for next year's bean, barley, and root crops, I started my steam-power smasher on October 10th on my 39 acres of heavy land bean stubble. This was completed on Saturday last, October 14th. My horses, besides shifting the steam engine and tackle, have to-day com-

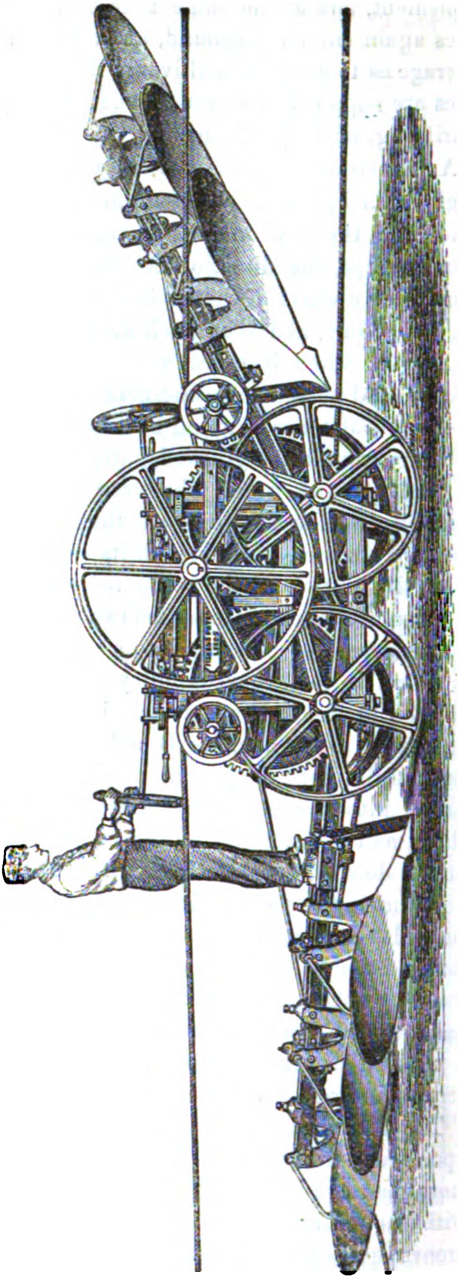


FIG. X.

pleted the drilling of wheat on my 39 acres of bean stubble; therefore my wheat-seeding is done, except 11 acres of clover lea, a part of which is already ploughed, and 4 acres after potatoes. My engine was set to work with the ridger and subsoiler on Monday last, on my heavy land-wheat stubble. It has already ridged and subsoiled over 20 acres, and in fourteen days more it will have completed the whole of the 92 acres of this kind of work that I have to do for next year's cropping—my seventeenth under steam ploughing. Here is the cost of working my 39 acres of heavy land for wheat per acre:—

| | s. | d. |
|---|---|---|
| Steam-power smashing ... ... ... | 4 | 7½ |
| Drilling with horses ... ... ... | 1 | 6 |
| Harrowing with do., twice over ... ... | 1 | 6 |
| Total per acre ... ... | 7 | 7½ |

My heavy land produces yearly full 12 bushels of corn per acre more than it did under horse-power culture and the dead fallow system. To get this I am obliged to have all my work done in the autumn, and so must every farmer in England if her 800,000 acres of dead fallow are to be made to grow corn yearly."

During a discussion which followed the reading of a paper on "The advantages of steam cultivation," by Mr. Thomas Aveling, at Maidstone, a few years ago, it was stated that the average cost per acre for ploughing heavy land with horses was 13s., while the cost per acre for similar land, steam ploughed, was only 6s. 9d. According to this calculation the balance in favour of steam ploughing upon a farm with 300 acres of arable land would be £93 15s. annually.

From calculations founded upon data obtained during the last few years, I find that with a light set of Fisken's tackle, ploughing has cost us very little, if anything, over 6s. per acre, and cultivating or stirring and harrowing in one operation, about 3s. 3d. per acre.

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THE HYGIENIC INFLUENCE OF PLANTS IN ROOMS.—There is yet another influence—of great hygienic importance—exerted by the presence of plants in our dwelling-rooms. The mind, as we all know, exercises an enormous influence either for good or evil upon the bodily health, and when pleasurable sensations are conveyed through the eye to the mind the physical health is affected and benefited. What, then, could be more grateful, refreshing, and delightful for tired eyes and wearied brains than to be surrounded by graceful plant-forms, so beautifully suggestive as these children of nature are of the scenes in association with which they are found when in their wild habitats?—moorland wilds, dripping rocks, shady woods, and those deep green lanes which are sheltered by embowering trees, lined with clustering moss, and redolent of the perfumed breath of sweet spring flowers.—*The Fern Paradise.*

# Abies Douglasii.

By W. McCORQUODALE, Wood Surveyor, Scone, Perth.

I feel very desirous of bringing this beautiful tree prominently before the notice of arboriculturists, it being in my opinion worthy of extensive cultivation, either as a plantation tree or an ornamental one.

From my own experience in rearing it, and from what I have heard from others, but especially from what I have learned of its utility from my brothers-in-law since their return from California, where the quality and usefulness of its timber is highly prized for all country purposes, I have every reason to believe that this will become the most remunerative tree of all our conifers. One valuable advantage which it has over larch and spruce is, that in dry sandy subsoils, where they are generally affected with dry-rot, the Douglas fir will luxuriate admirably. Before planting any humid, wet land with this tree, it should be thoroughly dried by drainage; and, so far as my experience of the tree goes, it is not liable to the attacks of injurious insects.

Its healing power after receiving injury is very extraordinary. I have seen trees barked halfway round the stem, in a manner that would prove fatal to any other conifer, whereas in the Douglas fir it heals over in two or three years. It is, too, a very accommodating tree, as it may be planted successfully at any season of the year. We have transplanted these trees from six to ten feet high, during the months of April, May, June, and July, without a single failure.

In 1857 we prepared, and enclosed with a fence proof against hares and rabbits, thirteen acres of poor moorish soil, which had been cultivated as arable land. It was planted with Douglas fir at 9 feet apart, and the intermediate spaces were filled up with larch and Scots fir in equal numbers, as nurses, to 4 feet apart over all. The plantation is now twenty-three years of age, and the nurses are pretty well thinned out; from the beginning it was intended to be reared to maturity as a pure Douglas fir plantation, and of course the nurses will ultimately be all thinned out. In December last, during the Tay Bridge gale, ninety-nine Douglas firs were blown down, all of which were set up again with the exception of five or six, whose roots were destroyed by being torn away from the tree in the fall.

This plantation is making rapid advances. I have just had some of the Douglas firs measured, and many of them stand 40 to 45 feet in height, by 4 feet 3 inches in girth at three feet above the ground.

Again, in 1860, 8 acres were enclosed with rabbit-proof wire netting on the estate of Taymount, alongside the Highland Railway, and planted with Douglas firs at 9 feet apart for the permanent crop, and the intermediate spaces were filled up with larch, as nurses. This plantation is now twenty years of age, and the nurses are all thinned out. It now stands a pure Douglas fir plantation, in prime condition, and is the admiration of all who see it.

The side next the railway was twice burned by sparks from passing engines, but to guard against future destruction by burning I had ruts cut parallel with the railway, each about a foot wide and eight inches deep; these were laid down at proper distances apart, so far back as to be beyond the reach of sparks from the engine. These ruts were again checked with cross ruts, and to make the thing still more secure, the grass between the ruts and among the trees was cut bare every autumn, and no injury has ever been done since by sparks from the engines. This is a mode of treatment to save young plantations on the side of railways from fire, which might be successfully adopted elsewhere.

There are several other small Douglas fir plantations laid down upon the Lynedoch and Logiealmond estates, which are also very promising; and thousands of plants have been put out as solitary trees, in filling up vacancies in old plantations. There is no tree I find so suitable for this purpose, especially in old plantations, as the Douglas fir. If there is head room at all, with light and air, this tree will rush up very rapidly.

Last spring, upon the estate of Scone, we prepared and enclosed with rabbit-proof wire netting, 37 acres of ground called Highfield plantation, which was planted with Douglas fir at 9 feet apart, with larch as nurses. A few acres were planted with various other conifers, for the purpose of being reared up as an experimental plantation. We have now begun to use the thinnings of Douglas fir as wire fence posts. In April, 1878, upwards of 20 of these posts were put into a new wire fence, and were marked to test their durability, alongside of some silver fir posts; the remainder of the posts forming the fence being of larch. The Douglas fir posts, although only of twenty years' growth, stood the driving into the ground as well as larch of the same age could have done. They are wearing well, and show every indication of making durable posts.

At Lynedoch there are five Douglas firs which were planted in 1834: one contains 132 cubic feet of timber, and another 121 feet. At Scone there are some fine large specimens about the same age.

As an ornamental tree it is both stately and graceful, and where shelter or screen is required there is no tree better suited.

I have formed a very favourable opinion of this tree, and I am certain that it ought to be most extensively planted.

## AN ANCIENT ELM.

In a work on trees by Dr. Westmacott, of Newcastle-under-Lyne, published in 1694, we find the following curious statement, which we give *verbatim et literatim*:—"Scarce any county ere produced such monsters as Staffordshire, as was the prodigious witch-elm that grew and was felled at Field (within memory) by Sir Harvey Bagot, the greatness and products of which tree I shall (for the diversion of my reader) take out of Dr. Plot's Natural History of Staffordshire:—

"It was so great and tall that two able workmen were five days in stocking or felling it down.

"That it fell 120 feet or 40 yards in length, that the stool was five yards two feet diameter.

"That the tree at the but-end was 17 yards in circumference.

"That it was eight yards and eight inches, that is 25 feet and a half about by girth—measure in the middle.

"That 14 loads of firewood, each as much as six oxen could draw to the house at Field, being not above 300 yards distant, broke off in the fall.

"That there was 47 loads more of firewood, as large as the former, cut from the top.

"That they were forced to piece two saws together, and put three men to each end, to cut the body of it in sunder.

"That there was cut of it 80 pair of nathes for wheels, and 8,000 foot of sawn timber in boards and planks, after six score per cent., which at 3s. per cent. came to £12. All which is attested (in a paper), foreseeing it would not be believed in after times, under the hands of—

"Sir Harvey Bagot; Will. Cowper, steward; Roger Shaw, bayliff; Will Dixon, surveyor.

Lawrence Grews, } Cutters.
Humphry Chettom, }
Francis Marshall, } Stockers.
Thomas March, }

"They computed it to contain 96 tuns of timber, a vast quantity for one tree, requiring good testimonies for its belief."

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Filial Obedience.—"Don't waste your time clipping off the branches," said a woodman to his son, "but lay your axe at the root of the tree." And the young man went out and laid his axe at the root of the tree, like a good and dutiful boy—and then went a-fishing. Truly there is nothing like filial obedience.

# Dragging Timber by Steam.

By DAVID TAIT, Forester, Owston Park, Doncaster.

Some months since, I observed a note in the *Journal of Forestry* calling attention to the use of the steam-engine in removing timber from plantations after it was felled. This is generally done by horses, but is often a very tedious and expensive operation, especially when the plantation from any cause is difficult of access. In the case of plantations grown on the steep, rocky sides of a glen or river bank, the timber has either to be taken to the top or bottom of the bank. When the latter is the case there is not much difficulty experienced, as even trees of large size can be moved down the hill with comparative ease, but when it is necessary to have the timber drawn to the top of the bank, and block and tackle gear has to be brought into use, the process is exceedingly slow. From such a position some years ago we had a quantity of timber to remove by horse-power, and had to avail ourselves of the standing trees at the top of the bank, fixing the stationary block high enough to pull the tree up at the same angle as the slope of the bank, while the horses, by means of a snatch-block fixed near the ground, pulled along on the level ground. As the tackle had to be stretched out three or four times in removing every tree, the work was accomplished very slowly. In the same plantation, some years after, there was another fall of timber to be removed, and this time advantage was taken of a traction engine forming part of a set of Fowler's steam ploughing tackle, the wire rope which pulls the plough being attached to a chain fastened round the tree, and the engine standing on the level ground at the top of the bank the heaviest trees were pulled up with the greatest ease. The engine-driver can at a given signal stop the engine at once if the tree is likely to catch against any growing tree, so that there is much less danger of "barking" the growing trees than when the work is done with horses. Of course it is only in the case of plantations fifty years old and upwards that it can be used to advantage, and for younger plantations there is not the same need for it.

It may be said by some, Why go to the expense of pulling out the timber? Why not sell it in the plantation, and let the timber merchant remove it? But the cure in such a case would be worse than the disease, as unless of first-rate quality there would be little competition for it, and the price obtained would be very small. We have seen timber in such positions sold for a mere trifle, which would have sold well had it been removed to a place where carts could get at it to load and carry it away.

On this estate during last winter we felled out a plantation of about six acres in extent, in a very low-lying position, on a soft, peaty soil, which in winter is quite unable to sustain the weight of a horse. Accordingly to get the timber removed on to good ground which would bear the weight of the timber carriages, we had recourse to one of the engines of a ploughing contractor in the neighbourhood. There being a piece of good ground on the outside of the plantation on which the engine was placed, between two and three hundred yards from the furthest point where the trees were lying, by the use of the wire rope previously mentioned, we very quickly cleared the piece. The only difficulty we experienced was in getting the wire rope pulled back for a fresh load. This we had to do by manual power, and to the furthest point it took four or five men to draw it. Where the ground is firm this can be most conveniently done by using a horse. We had four men of our own employed, and the owner of the engine supplied three, one of whom attended to the engine. The price charged for the engine and three men was thirty-five shillings per day, besides which, we had to supply the engine with coal. The time occupied was three and a half days, and the cost under eight pounds. The quantity of timber removed was four thousand feet. Several of the trees contained from sixty to seventy cubic feet, and these were shifted with the greatest ease.

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CLIMATIC INFLUENCE OF TREES.—Trees are magnificent regulators of climate; they are to it what the governor-balls are to a stationary engine. When the engine is going too fast the governor-balls distend, and "throttle" or compress the aperture whence the motive steam-power is issuing. When the engine is working slowly the balls droop, and so open the valve as to allow more steam to issue. The same with the woods and forests of a country. When the rainy seasons are on, every tree and plant absorbs some of the moisture, and stores it away into its own tissues. It thus prevents great quantities from flowing off the surface and gathering into rills and rivulets, and so swelling the main rivers as to cause them to overflow their lowest-lying banks. During periods of drought the leaves of the same forest give out the moisture they consumed into the atmosphere, and so prevent its being as dry and parching as it otherwise would have been. During the hours of night also the surfaces of the leaves become colder than the air, and thus the moisture contained in the latter is condensed upon them as dews. In many parts of Arabia this is the only kind of waterfall with which the parched earth is visited.—*Taylor's "Nature's Bypaths."*

# Trees at Hopetoun, Linlithgowshire, N.B.

By J. McLAREN, Forester, Hopetoun.

When I first thought of giving an account of the most noteworthy trees growing at Hopetoun, it did not occur to me that I would find it so difficult to make the subject interesting to the readers of the *Journal*; and I fear that although I give the measurements of a few trees, however large they may be, it will not convey any adequate idea of the variety and excellence of the growing timber on this estate. I may mention, however, that there are in the pleasure-grounds and deer park alone upwards of 1,700 trees, growing on much the same soil (viz., light loam, with a gravelly subsoil), measuring from 8 to 15 ft. in circumference, and from 60 to 100 ft. in height.

I shall now give the measurements of some of these trees taken in 1855 and subsequently in 1880, showing the increase of growth during that period.

The girth is taken at 5 ft. from the ground.

| | 1855. | | | 1880. | | |
|---|---|---|---|---|---|---|
| | Girth. | | Height. | Girth. | | Height. |
| | ft. | in. | ft. | ft. | in. | ft. |
| *Abies Morinda* (grafted) | 5½ | 0 | 50 | 7 | 0 | 63 |
| *Abies Douglasii* | 3½ | 0 | 62½ | 6 | 10½ | 72 |
| *Cedrus deodara* | 3 | 0 | 36½ | 5 | 8½ | 55 |
| *Pinus laricio* | 3 | 7 | 45 | 6 | 4 | 6 |
| *Abies canadensis* | 6 | 0 | 37½ | 6½ | 0 | 40 |
| *Liriodendron tulipifera* | 5½ | 0 | 62 | 7 | 5 | 80 |
| Scots Fir | 11 | 5 | 74 | 11 | 5½ | 78 |
| Silver Fir | 11 | 0 | 103 | 11½ | 0 | 105 |
| Larch | 9 | 9 | 99 | 10 | 5 | 101 |
| Common Oak | 10 | 0 | 106 | 11 | 9 | 110 |
| Beech | 14 | 2 | 100 | 14½ | 0 | 105 |
| Spanish Chestnut | 14 | 9 | 59 | 15 | 9 | 72 |
| Sycamore | 9 | 4 | 67 | 10½ | 0 | 80 |

A *Cedrus Lebani*, which was planted in 1748, measured in 1801, 10 ft.; in 1841, 16 ft.; in 1855, 20 ft.; and in 1880, 22½ ft. in circumference; height in 1880, 83 ft. The two last measurements only were taken by me. This is one of two cedars which were planted at the same time within 9 yards of each other; both seemed to have grown equally well for some time, but one began to decay about thirty years ago, and ultimately died, not, however, before it produced upwards of 400 cubic feet of timber. There are several other cedars here, but none quite so large as the above-mentioned; the next in size measures 14 ft. in circumference, and 70 ft. in height. This is growing on the bank of a small brook about 60 ft. from the two above mentioned.

# A General Knowledge of Estate Work Beneficial to Young Foresters.

By ANDREW SLATER, Loftus-in-Cleveland.

It has been asked what can young foresters do to obtain a situation as head forester? It may happen that the supply will exceed the demand for head foresters on large estates, or even on estates of medium size, but one thing is certain, that if young men wish to climb to the top of the tree, they must do so step by step. I may here be permitted to tell my young friends how I became a head forester and superintendent of estate work.

At the outset I may state that my first performance of forest work was peeling oak coppice at 4½d. per day. I continued the same kind of work during five seasons, attending school in the intervals. At the end of that time my wages were 2s. 6d. per day. I was then sent to a famed agriculturist to learn farming. I remained five years there, and at twenty-three years of age I went to an extensive estate near Perth, where numerous improvements were being carried out in a most substantial manner. I remained there eight years, and went to an estate in the west of Perthshire, first as working forester, and soon as forester and superintendent of the general work of the estate. I remained there twenty years, and I have now been here eleven years as forester and superintendent of the general work of the estate.

Large estates are not always the best schools for young foresters. There are exceptions, especially where the owner moves out of the old beaten track, and imports into his woodlands some of the natives of foreign forests. It will be found that on comparatively small estates a far greater variety of conifers and other useful and ornamental trees are to be seen, than on large estates. A young man, striving to excel in his profession, should not refuse a situation on a moderate-sized estate, even though only as a working forester.

I am aware that young men are sometimes very impatient if they cannot reach the goal of their wishes at one leap.

I know this from past experience, and I do not blush to confess that I thought myself wiser thirty years ago than I do now.

In addition to a knowledge of arboriculture, a general knowledge of estate work would be beneficial to all young foresters. On estates of limited area, where a working forester is kept, one having a knowledge of estate work, so far as to be able to superintend it in all its details, would find it of great advantage in a pecuniary sense, and if he managed well it would fit him for the post of land steward on an estate of greater extent. I know several men that began life as foresters that are now managers of estates in England. On estates of limited area, where the duties of forester and superintendent of works are combined, a considerable saving is effected to the owner in salaries, as well as having the work of the estate executed in a substantial and proper manner by an experienced person.

Managers of estates are sometimes draughted from offices and other establishments where estate work is entirely unknown. These servants of the estate when installed in office, having only a knowledge of book-keeping, find themselves quite at sea out of doors, and have to place themselves as pupils, in a quiet way, under some of their subordinates. The estate is the only school where a thorough knowledge of estate work can be acquired, and a young forester who has attained a general knowledge of the work must be far superior to the man that has not.

An estate where improvements are being carried out under the management of an experienced superintendent is the best school to acquire that knowledge, and it is only where such is the case that young men should go to learn. I do not mean that young men should learn the trade of blacksmith, mason, joiner, plasterer, &c., but that they should be able to detect any deviation from the plans and specifications of whatever kind of work is being executed on the estate, and also to measure the work when finished.

They should also be able to make plans of buildings required on the estate. Their evenings would be profitably spent in acquiring a knowledge of that art, and if they became managers of estates afterwards, they would find it useful, in fact an acquirement that they could not well do without.

A scientific knowledge of agriculture would be a recommendation for young men intending to push their way as estate managers, to enable them to advise antiquated farmers how to cultivate their farms to advantage.

Much information may be obtained from various publications which are now before the public. A small treatise by Professor Johnston, called a *Catechism of Agricultural Chemistry and Geology*, price one shilling, contains a great amount of information both to the agriculturist and arboriculturist, and is well worthy of careful study by every cultivator of the soil, or owner of any domestic animal. It has been revised by Dr. Augustus Voelcker, consulting chemist to the Royal Agricultural Society of England, and can be had from any bookseller.

If this country is not to lag behind the other countries of Europe, the owners of the soil will require to bestir themselves by using their influence and substantial assistance to promote the education of young men as scientific arboriculturists and agriculturists. The interests of landowners are most deeply concerned, and however anxious young men may be to become scientific foresters (and no doubt many are), the expense is a bar to their wishes being gratified. Self-reliance is a noble virtue, but it cannot overcome impossibilities.

It is very strange why in the national schools of England no scientific subject can be taught. A certain number of standards are taught, and that done, so far as these schools are concerned, the pupil's education ceases. The teacher is not bound to teach anything else. Any one wishing to educate his family in scientific subjects, such as are necessary to the proper cultivation of the soil, must send them from home to attain that object, and at a cost of not less than fifty pounds a year, which in nine cases out of ten renders it simply impossible for them to do so.

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WHAT NEXT?—From sawdust, ground-up twigs, and like materials, pails, tubs, mouldings for buildings, doors, sashes, blinds, &c., are now manufactured in a new paper-mill at Great Falls, Windham, Maine.—*American Paper.*

SOIL FOR FERNS.—Fern soils may be said, generally, to be of three kinds, consisting of leaf-mould, peat, and loam; and most of our old woods and forests will be found to furnish all three, oftentimes lying in regular gradation one over the other. Leaf-mould is a vegetable soil, consisting, as its name indicates, of decayed leaves. Naturally this soil—in places that have remained for a long series of years undisturbed—will be found on the surface of the ground, having been there formed by the accumulation and decay of the leaves which annually fall from the trees. Immediately underlying the leaf-mould, peat—also a vegetable soil, but one consisting largely of root and other vegetable fibres—will often be found, though it is more particularly boggy and marshy ground that furnishes peat. Lower still we may come upon a stratum of what is called loam—a sort of clayey earth, existing under varying circumstances in varying degrees of lightness or heaviness. Those who may wish to learn the secret of the luxuriance of ferns in a forest would do well to study the exact position as regards soil which these plants occupy, and to compare their varying degrees of prosperity with the varying circumstances of their growth. If this be done it will invariably be found that the lower sides of the ferns are embedded in peat or loam, or a mixture of the two, whilst the upper parts are surrounded by deposits of leaf-mould. The first-mentioned soils chiefly furnish the moisture required by the roots and rootlets; the leaf-mould supplies the chief part of the nutriment.—*The Fern Paradise.*

# Hints towards a Science of Forestry.

By SAMUEL NEIL, Edinburgh.

Science is seeing into things and their causes. Things seen are facts, but the causes, principles, and reasons of things are science. A knowledge of facts—even though that knowledge is arranged in the most systematic manner possible—does not constitute science. All science requires correct knowledge *and* the true reasons why things are as they are. Forestry has hitherto, for the most part, been a practical art—resting upon the experience of those who practise it, and being therefore in a great measure empirical and experimental. That Forestry should take its place among the sciences is very desirable; for science ascertains the certainties of things. Science depends on true observation, rightly interpreted to the reason and accurately registered for reference and inference. Everything that affects the tree-tenants of our forests and woodlands, our parks and hedgerows, ought therefore to be carefully noted, duly registered, sedulously watched, and patiently thought over, in order that Scientific Forestry may become not only a possibility but a reality of the future.

Science is experience realized in all its fulness and understood in all its bearings. It is not only that which wins upon the eye or furnishes profit which demands recognition in science. The entire phenomena of tree-growth and the utilization of timber come within the ken of Scientific Forestry. The scientific observer and reasoner has perennial duties and pleasures in the study of timber and timber-trees, of forest trees and their reproduction. Every tree is a study, and a regular census of plantings and transplantings, growth and cuttings, is as requisite for the arboriculturist as statistics are for the statesman. The bud, the blossom, the leaf, the fruit, are each objects of study; but so are soil, site, air, heat, light, moisture, seasons for planting or transplanting, rate and causes of growth, modes and times of pruning, thinning, and other forestal operations as well. In addition to the epiphytic and parasitic growths which affect trees, the ferns, fungi and mosses which fringe their feet or cover their bark; the insects which prey on them; the birds which injure them; the animals by which they are ill-used; the storms which break, blast, or destroy them, must find a place in the study of the forester. The principles of nutrition, growth, beauty of both branch and leaf; the means for securing perfection of fructification, grafting, or transplanting; the conditions on which wholesome products for the timber-market may be periodically available; the drainage, natural or artificial, that planted lands require; the economy of management and of distribution, and such arrangements as may provide not only a return of, but a remunerative return for the outlay involved in properly carried on arboriculture, still further add to the topics of thought which should exercise the minds of those who make a speciality of Forestry.

It is a high delight to look upon the living masses of trees which clothe upland or undulation in wood and field. But the keen-set eye of the scientific arboriculturist, even when he surveys the beech trees of Buckinghamshire, the elms of Worcester, or the oaks of Herefordshire, stretching along in lengthy avenue or pleasant alley, gathered upon clumps, adorning knolls, or extending over miles of woodland, likes to discover what sort of soil most favours the fine-boled giants whose lusty vigour he notices, and the conditions under which their culture has been carried on, so that they have produced the magnificent results, of which their measurement is a sure index. The beauty of arboreal forms, the poetry of their associations, the utilities of their timbers, the speculations which arise in one's mind in woodland valley, planted level, or tree-crowned mountain top, may animate and agitate the common mind, but the arboriculturist seeks beyond these for the causes of the effects which spread themselves before him. He seeks the science of the sylvan successes he sees, and longs to learn the reasons and principles which explain the growth, for instance, of such a beech as that blown down in 1865, near the west corner of Worksop Manor House, whose branches covered one thousand square yards, and whose bulk supplied upwards of forty tons of timber. As yet, however, forestal science is in its infancy. It is empirical like the astronomy and chemistry of the olden time, and something must be done to take it out of the rank of practical art and bring it into that of certified science.

It is the purpose of this paper to furnish a few hints to arboriculturists the systematic and simultaneous observance of which, by those engaged in Forestry as a profession or a speciality, may aid in transforming the experiences of the present into the science of the (almost immediate) future. Of course, the writer makes no pretensions to originality in the suggestions he ventures to offer. They have almost all been practised here and there, he believes, by many cultured Foresters, and some of them set down here to give completeness to the scheme, have been incorporated in the actual proceedings of almost every tree-grower. It is rather, therefore, the scheme in its wholeness, and in the means recommended to register, generalize and preserve the fruits of observation, the records of facts and results to be ripened into science, that their value (if they have any) consists. It is still less, the writer may also remark, his aim to set forth these suggestions with dictatorialness of manner or assumption, though the necessary brevity of expression required in the limits of such an article as this, may give them an appearance of dogmatic statement which is by no means intended by the suggestor. He is desirous of subserving Forestry, not of offending foresters.

It is quite true that other means and other forms than those to be proposed might as adequately effect the object in view, and superior modes of accomplishing the desired end may in some quarters be actually practised. The great point, however, which science seeks to reach is, what is universally true?—what may be regarded as invariably trustworthy, all circumstances being the same? There need be no discussion as to the originality or the relative value of what is set down, if consent be given to the suggestion that Foresters should endeavour to acquire a knowledge of the principles of science, and not only conduct their forestal duties in accordance with these, but note and register all that is done by them in such a way that the facts may be used as the basis of scientific induction and the source of scientific instruction.

Forestry is not a primary but an applied science. Geology supplies the Forester with a knowledge of the constitution and distribution of the inorganic matters which form the upper crust of the earth, the materials of which the cultivable surface of the land is composed, the manner in which the materials are arrayed, and the qualities of these materials so far as they refer to their capacity of yielding nourishment to tree life. Chemistry explains how the disintegrated materials of the earth's crust, subjected to the action of the atmosphere, of water, and of decaying animal and vegetable products, form soil and subsoil; by what constituents, singly or in combination, these disintegrated materials furnish the means of growth to plants; and in what conditions they may be best used to promote healthy increase. The arboriculturist requires, by combining the knowledge derived from these two sciences, to be a geognost in soils, their qualities and their requirements. The influences of air and water on the life of plants necessitates an acquaintance with the laws of meteorological phenomena, and the deductions made from these, theoretically, in Hydrology and, practically, in Hydraulics. That the forester may carry out such operations in drainage and for irrigation as may be most advisable, both wisely and well, he must be able to estimate and calculate active force and the action of frost; the power, direction and prevailing characteristics of wind; and to determine on what must be sheltered and what may be exposed. Of Botany as the general science of plant life, the arboral student requires a more than ordinarily wide and accurate knowledge. Theoretical Morphology, as the interpreter of the transmutations of the forms, tissues, and organs of vegetable products; and Phytonomy as the teacher of the characteristics and the distribution of species, may not be disregarded by him. Both Vegetable Physiology, explanatory of the various kinds of organic activity in plants and vegetables, and Chemistry, giving account of the changes effected in the living process of plant-growth upon the materials furnished by earth and air, must be studied with accuracy and applied with skill and care. Taxology, or the classified and systematic arrangement of plants; and Phytogeography, or the relations of climate, altitude, geological and historical changes, &c., to the distribution, limitation and peculiarities of plants, call for attention; and of course Economic Botany, which treats of the uses of plants and their application to the arts, and Diagnostic Botany, taking heed of the diseases of plants and the remedies which may be employed for them, commend themselves most strongly to those who have charge of the timber wealth of such a land as ours. The studies, therefore, of the scientific Forester must cover a very large portion of the extensive field of systematic Botany.

To a fair knowledge of these extensive and intricate sciences, the arboriculturist must add such an acquaintance with mathematics and mechanics as may enable him to calculate and test the strength, tenacity, and resistancy of timber; to gauge and estimate its solid contents, and its real as well as comparative value; so large an interest in social and political economy as to notice the progress or drift of occurrences likely to affect the use, sale, supply of, and demand for, timber; and such accurate power of understanding the state of trade and the condition of the market as to know what, when, and where to sell. History, geography, engineering, the progress of the industrial arts, the teachings of commercial economy and a large number of sciences and arts become, or can be made, subsidiary and contributory to the scientific success of forestry. Nor must we forget to note that the forester must be a man with an eye for the beautiful in landscape, and with the power of imagination to project before his mind the likely results of his operations in their effects in garden, park, lawn field, or woodland.

This somewhat extensive outline of the course of scientific study implied in systematic timber culture does not, however, exhaust the stock of requirements which the arboriculturist must hold stored up in his brain and mind, on the supposition that forestry is to be a scientific pursuit. All these sciences yield truths and teachings which the timber-grower requires to know and act upon if he would succeed in bringing to the highest mark and best market the product of his toils. But they require selection, adaptation, and application. They are only the unassorted materials from which a science of forestry may be, and should be educed, constructed, and set forth.

In some such form as follows, the Science of Forestry might be sketched, and if its various departments were taken up, considered, and settled by those who have the best knowledge of each and the best means of observing, experimenting, testing, and deciding upon the matters to be dealt with under each head, it might soon take its place among the real sciences.

I. *Historic Arboriculture.*—This department should include, as far as may now be ascertainable:—1. Accounts of the earliest known or original *habitat* of the various sorts of timber-trees. 2. Statements of the times at which the different species of trees are first mentioned in the history or literature of the different countries in the world. 3. Notices of the introduction, transplantation, or immigration of timber-trees in different places, and also the decay, dying out, or failure of indigenous trees. 4. Notes of forestal lands, their early condition, their progress and their present state. 5. Certified records of experiments made in timber-growth, giving dates, species experimented on, and results. 6. Miscellaneous or unintentional croppings up of trees by windwaft, seadrift, &c., or any remarkable incidents in the history of timber-trees or of timber.

II. *Observative Arboriculture.*—This ought to supply:—1. Accurate statistics of the present state, extent, value, &c., of forests, woodlands, plantations, groves, &c. 2. Accounts of definite and special experiments made in arboriculture in recent years, stating the aim, the condition, the expectations, the results, the difficulties and the unforeseen occurrences which affected the issues beneficially or disastrously up to the present time. 3. A careful and accurate list of all fresh plantings, transplantings, and experiments in seedling culture undertaken now, to be followed by given quinquennial or decennial reports of progress or failure—stating (1) soil; (2) condition of plants; (3) mode and form of (*a*) planting, (*b*) drainage, and (*c*) irrigation; (4) meteorological phenomena; (5) average and special rates of growth, pruning, thinning, failures, &c. 4. The general adoption by foresters of photography—according to scales—for the periodical exhibition of the state of special or test trees, the scale and measurement to be uniform and the period fixed by some organized body—*e. g.*, the Scottish Arboricultural Society.

III. *Scientific Arboriculture.*—Under this head there might be arranged and compiled a handbook of Scientific Forestry, clearly and briefly setting forth all that is known about:—1. Vegetable growth, root-tissues, and fruit. 2. Soil and subsoil in relation to growth. 3. Air and water as agents of growth. 4. Vegetable absorption, and exudation. 5. Sap and substance. 6. Boles, ramification, pruning and dressing. 7. Cup-shaking, heart-shaking, cleaving, stag-headedness, blasting, &c. 8. Woods and their uses. 9. Landscape arboriculture. 10. Preparation of wood for the market. 11. Testing, measuring, &c., of timber. 12. The commercial value of timber.

IV. *Practical Arboriculture.*—Under this division would fall explanations of the details of the management of timber, from the preparation of the soil and plant, during the whole process of growth, till the tree is felled, prepared, and passed out of the forester's hands; notes of exceptional circumstances in growth, and the measures adopted in regard to them; accounts of fencing, guarding, &c.; of attacks from insect, parasite, epiphyte, bird or animal, and the means taken to cure, lessen, or destroy the evil; of tools made for horticultural work—the purposes they serve, and how to use them; considerations on the times and seasons for arboricultural processes, &c.; and instructions regarding the most usual and best methods of managing them.

*V. Industrial Arboriculture.* Timber has many uses in the arts, and Forestry furnishes to industry many of the agents on which it exercises craft, skill, and ingenuity. This branch of scientific forestry would deal with such timbers as are convertible into articles of use, or ornament; the qualities they possess or require to adapt them for such purposes; how to avoid or detect defects in trees grown for, or about to be employed in arts or manufactures. It would point out to the tree-grower the kind of timber domestic and commercial requirements brought most in demand, and the qualities, properties, and strength that timber ought to have that it might be advantageously used in ship or house building; for joinery or cabinet-making; for art-purposes, like carving or industrial use, as in bridge and pier construction, and other forms of engineering. It would, in fact, take into account the whole of the useful applications of timber, from firewood, railway sleepers, and pit-siding, to ship building, art-furniture, and articles of luxury like the carvings of Grinling Gibbons and the cabinet for Warwick Castle shown in the Exhibition of 1851.

VI. *Economic Arboriculture* would lay down the principles on which:—1. Capital might be expended in timber-growing. 2. Profits might be expected from it. 3. We should know when markets were favourable or the reverse; and 4, we might regulate planting with the best prospects of success. It would explain—1, the sweep and state of the industries employing timber, and the arts requiring them; 2, the relation of the supply to the demand for timber; and 3, afford the means of judging what timbers will suit the market and remunerate the grower by forecasting the probable requirements of consumers.

VII. *Æsthetic Arboricultur*—eexpository of the principles of the picturesque and the beautiful in forest scenery, the art of landscape gardening, the best mode of grouping, arranging, and placing trees in clumps and on knolls, forming walks, alleys, and avenues, and massing them so as to produce the best effects in the scenery which any given estate affords.

It would be easy to enlarge upon the advantages that would accrue from the upbuilding of such a Science of Forestry as that but dimly shadowed forth in the foregoing paragraphs, and to expatiate upon what an improvement, both in men and things, would result from the institution of a School of Forestry, in which a curriculum of study was pursued by those who were to have the charge of the timber of the future. We must, however, leave all that unexpressed, to engage the thoughts and imaginations of the reader.

We may be asked, How may such a scheme be rendered possible, and in what way may a start be made? We would suggest (1) that the wardens of Royal Forests, the keepers of our public parks, the curators of the gardens of the nation, and those who hold office under them, might be called upon to supply statistics and statements regarding historic trees; (2) that office-bearers of Horticultural, Agricultural, Botanical, and Arboricultural Societies, might be useful in supplying the material elements of a theory of timber-training; (3) that the Government departments, and the nobility and gentry of the country, might provide photographs of individual trees and special woodland scenes, done to scale, and so fitted for scientific purposes; (4) that the Scottish Arboricultural and cognate Societies, by extending and systematizing their prize-essay arrangements, might work out many of the minor requirements of such a science.

The *Journal of Forestry*, as the organ of the tree-growing interest, is even now becoming a more and more valuable repertory of those practical, statistical, and descriptive papers, which form the elements from which science collects its materials. Giving opportunity, as it does, for bringing forward the views, experiences, and suggestions of those who can best lay the inductive foundations of such a science—practical foresters—it must be helpful in providing the *prima stamina* of Forestal Science. Let it be largely utilized as such, and let it rouse public and private interests to a sense of the importance of Arboricultural Science. Then, when a science of Forestry has been framed, a Professorship of Forestry may be claimed, a School of Arboriculture will arise and flourish, and the *Journal of Forestry* will be the guide, philosopher, and friend of Scientific Arborists.

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Appointment.—We understand that Mr. Geo. E. Brown has been appointed head forester to the Earl of Kenmare, at Killarney, county Kerry.

## ENGLAND.

OTHER work should now be so well in hand that during the month the forester's attention may be almost entirely devoted to planting. Some of the very wettest soils may be reserved for spring planting; but the greatest breadth of that which can be profitably cultivated as woodland should be planted by the middle of November. In planting high-lying silicious soils it may not be desirable to disturb the ground, there notching will be found the best and most expeditious method. Such soils are best fitted for two years' transplanted larch and Scotch fir. The absence of alkalies in the soil unfits it for anything except pines and firs.

Wherever the land intended for plantations has been previously under trees, all remains of the former crop should be collected and removed, or burnt up. But previous to replanting it will be far better to take one or two crops of roots, or forage crops which have been well manured. The complete cleaning and pulverization of the land for such crops is the best possible preparation for young trees.

Wherever transplanting is going forward during dry weather early in October, it may be found necessary to puddle the roots of the trees during their removal. This is more especially necessary when the planting sites are distant from the nurseries.

Small plants up to about three feet in height, when put into open ground where they are not liable to be smothered by weeds, will in the course of a few years generally outstrip those transplanted of a larger size. This is found to be more especially the case when they are robust in growth and well rooted. Firs under two and a half feet, and deciduous trees under three feet, are to be recommended for ordinary planting. In practice we have found the greatest success follow the use of one year's seedling larch which had been two years transplanted, and two years' Scotch spruce, and silver fir, provided these had previously been afforded ample room in the nursery. For plantations of ash, birch, sycamore, hornbeam, and elm, two years' seedlings which had been two years nursed. Ash, beech, and Spanish and horse chestnuts of the same age should have been tapped in the nursery previous to removal. Tap-rooted plants are generally found to succeed better in plantations if they have had one removal after undercutting, previous to their final transplanting.

The preparation of seed-beds, and the sowing of such tree seeds as have ripened will require attention before the end of October. If such can be secured from the depredations of mice and other destructive rodents, this is by far the best time for putting in acorns, walnuts, Spanish and horse chestnuts, and hazel nuts. If planted in a good loam the start these get in the spring will more than compensate for the trouble which has been taken for their preservation.

Cuttings of various kinds should be put in early in the month—Portugal and common laurel, ribes, dogwood, alder, elder, lime, plane, and poplar. The lime, elm, maple, and some other trees may still be layered. The seed of the Norway maple is generally ripe early in the month, and the sooner this is sown the better. A bushel of it has been known to produce about 12,000 plants.

All tree seeds now collected and laid up for spring sowing should be well harvested. An airy room where they can be kept constantly turned is best adapted to these. Alder seeds in particular require to be well dried before being stowed away. These, as well as the birch, may be sown direct from the trees, but both are liable to be cut back by spring frosts.

Falls of underwood should at once be allotted and measured off, and the conditions of sale prepared. The sooner the lots are in the market, the greater are the chances of early falling and clearance.

*Pluckley, Kent.* A. J. BURROWS.

## SCOTLAND.

STILL attend to recently-formed plantations which have not been overtaken yet, and see that the rank grass and other herbage does not fall upon the young trees, which proves very detrimental in a snowstorm.

The recent floods have done damage to river embankments in some parts of the country. "A stitch in time saves nine" with regard to repairing this. Stones where they can be got, or stones and whole trees mixed together, make the best material for this job.

Preparations for planting should be pushed on, such as clearing the ground of whins, laying out of roads, fencing, &c. Where the ground is wet and requires draining, this should be done at least a year before (two years is better), as the drains require that time to draw properly. If the plantation, on such wet ground, is of such an extent that it can be done in spring it is better to delay till then, planting the hard wood first, then the firs. It is best to plant just when the roots are beginning to move.

The winter work—thinning and felling timber — may be begun about the end of the month. W. W. R.

## WALES.

As recommended last month, continue to enclose and prepare ground to be planted during the coming season. Where the ground is thoroughly dry and warm, planting may be proceeded with towards the end of the month. Ground in course of preparation, or of a cold, stiff nature, may be left unplanted until spring, when the drains will have had time to act, and the soil be in a better state to receive the young plants.

Fir plantations may now be thinned, clearing out the thinnings and branches as the work proceeds. Open drains should also be cleared out after thinning plantations, as they are liable to be choked with branches, &c., in the dressing and removing of the thinnings. Draw to a close the pruning of hardwood trees, &c., and finish the mowing and clearing of all shooting drives and rides as soon as possible.

Thorn hedges may now be planted in dry and well-prepared ground and warm situations. Continue the cutting and switching of hedges, and put all other fences in good repair.

Roads and drives should now be put in repair, and well rolled with a heavy roller, so that they may become bound and consolidated.

Nursery stock should be selected as soon as possible for the present season's planting. As the ground in the home nursery gets cleared it should be turned well up to receive the winter's frost; and where a green crop has been taken therefrom, it may be filled up with plants of the fir tribe.

Evergreen trees and shrubs may be removed and transplanted as last month.

*Kinmel Park.* LEWIS BAYNE.

## IRELAND.

ALL preparatory operations for planting ought to be completed as soon as possible now, to enable the forester towards the end of the month to turn all available hands on to general planting. Care must be taken not to remove deciduous plants before they have ripened their young growth, or many of the latter will die back. When once begun, no other work should be allowed to interfere with planting.

Continue thinning young plantations and felling heavy timber except such as have to be stripped for the bark. Trim hedges on the farm, and clean out open ditches. The fall of the leaf having begun, it is necessary to keep a sharp watch upon open drains and sewers, to prevent them being choked by the fallen leaves.

Plant new hedges, and repair failures in old ones. Dig the soil at foot of young hedges, and clean off the rubbish.

Begin planting in the nursery, first cleaning the ground thoroughly. Cuttings of various sorts may now be put in, also layering. Seeds of different kinds should be sown, such as thorn, holly, ash, mahonia, Spanish chestnut, oak acorns, &c., which may all be sown in well prepared soil.

*Ballinacourte, Tipperary.* D. SYM SCOTT.

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THE DECAY OF TREES—THE GOAT MOTH.—Some time ago several splendid old trees at Brahan were discovered to be dead. An inquiry was at once instituted, and when they were examined, an animal, happily a rare one, was discovered in or about each. The conclusion seems to have been at once formed that this creature had destroyed the trees, and had thus occasioned the death of great plants which had witnessed generations. Had the goat moth anything to do with the recent decay of that pretty row of Lombardy poplars at the Chapel Yard, Inverness? We are favoured with interesting notes on the subject from correspondents of practical experience. One gentleman says, "My opinion is that this moth is the result, not the cause of decay in the trees in which it is found." We give the notes from a second correspondent as follows :—"As regards the goat moth, I did not know before that he was such a terrible creature as he turns out to be. I believe he derives the name goat moth from his very disagreeable odour. He is of a dark-gray colour, dotted with black and white ; and he has a thick, dumpy neck and head, and stout body. As a caterpillar he is red on the back and yellow on the belly. I believe the Romans thought a good deal of him—they made a fine dish of him when in a caterpillar stock! I believe he will attack the Lombardy poplar, but his favourite trees are the willow (especially old trunks of trees) and the elm. The oak he will also attack, but the willow and elm are his chief favourites. When he is boring the trees he disgorges a sort of chemical juice, apparently to soften the wood, and thus to make his work easier. So much now, but I must make further inquiry about him. I may add he is one of our largest British moths. As to the decay of the Lombardy poplar, my opinion is this—his thread of life is run. We know to a certainty that plants (that is trees) have a cycle of time allotted them, at the end of which they die out, and others take their place. May this not be the case with the Lombardy? At all events, any that I have seen I have found them gone at the roots. Now no caterpillar will attack the roots of a tree ; at least I am not aware of any that will do so. I have not, however, seen trees of any size cut down and examined. Those familiar with trees are aware that there are two varieties of the Lombardy poplar—a male and a female. Generally speaking, it is the male that nurserymen have, and send out for planting ; and these are they that decay so soon. And I have seen the female variety growing luxuriantly where the other hung its head. I have given you my idea ; take it for what it is worth."—*Inverness Courier.*

[*Correspondents sending letters signed with initials or fictitious names are requested to enclose their name and address, as otherwise their communications cannot be inserted.*]

## DETERIORATION OF SCOTS FIR.

SIR,—Allow me once more to intrude upon your space, and then I am done with the above question—at least so far as Mr. McCorquodale is concerned with it,—for it would appear that not only is Scots fir degenerating, but the controversy as well. Without attempting to follow your correspondent into all his wanderings from the subject, I may just state in a word that my experience of the foreign Scotch fir differs entirely from his. I have grown it for a sufficient number of years myself to be able to form an opinion, and observations on older plantations still more confirm that adverse opinion. But it requires no argument of mine to establish this, there is a consensus of opinion against the foreign Scotch fir already,—that is the opinion of experienced practical foresters themselves. If it possesses the merits Mr. McCorquodale says it does, Why not advertise it? Let it be openly known there is such a thing in the market, instead of, as at present, smuggling it into the trade under an assumed name. I know a leading nursery firm in the south of Scotland, who are so particular about this, that they bring the cones from the native forests in the north, and extract the seeds themselves in their own kiln, thereby involving a good deal of extra trouble and expense. In order that your correspondent may not misunderstand me, I say again that the foreign is inferior to the native for general planting in Scotland. There is no doubt a difference sometimes amongst the foreign itself, but it is a difference in degrees of badness, not of goodness. My object for saying anything at all on the subject will be fully attained if it acts as a caution to some of my young friends who have just started in life as a forester. In a favourably situated nursery the foreign "Scotch" fir makes an extra strong growth when left in the lines for two years. This tendency is peculiar to it, and totally unfits it for general use in Scotland. Mr. McCorquodale finishes his last letter by coolly saying that it would not astonish him if the brown seedlings are native and the green ones from foreign seed! I might turn round with equal effrontery, and tell him that it would not surprise me if the three varieties of seed he has been experimenting with were all sown out of the same seed-bag, and are all exactly of the same kind!—a possibility as likely to happen in the one case as in the other. W. W. R.

## LARCH "BLIGHT."

Sir,—I herewith send you a few "blighted" twigs of larch, cut from trees about ten years old. They are growing in a good loamy soil, which was deeply trenched previous to planting. Larch trees, both older and younger, in different plantations, are also affected with the same "blight." The older trees are growing where a crop of hardwood was cut down shortly before the trees were planted, and the younger trees are growing in a light loam, with a gravelly subsoil. The foliage got quite brown last summer, and several of the trees are now dead. Some have lost their leaders, and the ends of the branches are in many cases quite dead. On many of the trees that are worst affected the foliage is breaking out from the stems. Where the leaders are not quite gone the trees have made a little growth this season, and I think they will yet recover. The twigs sent are cut from some of the trees that are likely to come round.

Am I right in supposing that, owing to the long wet, cold, and sunless summer of last year, the wood was badly ripened last autumn, and that frost is the main cause of the blight? I presume the foliage breaking out round the stems of the trees is due to weakened vitality, and there is not much chance of them budding next year.

Has the larch bug (*Adelgis laricis*) been the cause of the "blight" or disease? or have the trees been infested after being frosted? I am inclined to lean to the latter opinion, but I will feel grateful for the opinion of others on this seriously important matter. I may add that neither young plants in the nursery, nor trees two or three years planted, have suffered in the least. In all cases here the most healthy and vigorous growing plantations have been worst affected.

*August* 31, 1880. L. B.

[The twigs sent by our correspondent are badly infested with the larch bug (*Adelgis laricis*), and we hear from many different parts of the country that it is doing great damage this season to larch plantations. We shall be glad to have the opinions of those who have had experience of its ravages upon the various points raised by our correspondent.—Ed.]

## THE SYCAMORE AND THE PLANE TREE.

Sir,—Permit me to correct a small error in the interesting account of the summer excursion of the Scottish Arboricultural Society, given in last month's Journal. In describing some fine old sycamore trees growing near the ancient churchyard of Dolphinton, in Lanarkshire, the writer says that some of the party were as much enchanted with one of them as Xerxes was with a sycamore tree he encountered when marching with his army to invade Greece. Now it is right to notice that the Grecian tree referred to was not a sycamore as now understood, but, according to the description of it given by Herodotus, must have been an Oriental plane, under the shade of which the Persian monarch lingered so long that the delay caused his defeat. The sycamore (*Acer pseudo platanus*) is a maple, frequently called a plane in Scotland, owing to the similarity of its broad palmate leaves to those of the *Platanus*, or true plane tree. A full description of both trees will be found in "London's *Arboretum Britannicum*;" and although they differ very much in many respects, they are both strikingly beautiful trees.

Many handsome specimens of the *Platanus orientalis*, or Eastern plane, and its varieties, may be seen in the parks and squares of London, and even in the streets of the City. Thousands of City men pass and repass daily a fine *Platanus* tree which stands at the end of Wood Street, and whose beautiful foliage strangely contrasts with the crowds and noise of Cheapside. There is another fine plane tree in the retired precincts of the Stationers' Hall, only a few yards from Ludgate Hill; and here also one is struck with the luxuriance of a tree growing in such an unlikely place.

The sycamore tree has heavier foliage and more ponderous branches, but although less graceful than the true plane tree, it far surpasses it in grandeur, and in the beautiful effects of "light and shade" produced by the masses into which its foliage is gathered. It is likewise a very valuable timber tree, and will grow to a large size in the most exposed localities, seldom showing a weather side, but keeping an erect, well-balanced form on every side. It is also found to withstand the usually injurious effects of sea spray, and it is a matter for surprise that its many excellent qualities are so frequently overlooked, and that it is so seldom planted. Few trees will beat it for shelter and ornament, and its timber is always in demand for turnery, cabinet-making, musical instruments printing blocks, &c. There are many fine sycamore trees in Scotland, varying from 12 to 20 ft. in girth four or five feet from the ground; but it has not been so often planted in the south; and if any of your readers know where good specimens may be found, it would be interesting, if they would kindly take the trouble, to send a short notice of them to your Journal.

There is a very good selection of maples, of different sorts, to be seen in the Arboretum at Kew, many of which would add greatly to the beauty and variety of ornamental plantations; and now the planting season is so near, I would strongly recommend intending planters to give the sycamore and the other maples a place in their arrangements.

3, *Broadlands, South Norwood,* Wm. Baxter Smith.
*6th Sept.*, 1880.

## IVY ON TREES.

Sir,—Having seen several inquiries in your *Journal* as to the best mode of destroying ivy on trees, I suggest the following, which has been extensively practised on this estate. For several years as many as eight boys, with a man in charge, have been constantly employed in trying to eradicate this noxious climber. One of the boys goes before with a hand-bill or small hatchet, and carefully cuts the ivy around the bole of each tree at a distance of three feet from the ground; the others, following with light mattocks, grub up the roots for a couple of feet in circuit round the base of each tree, also removing it from the trunk up to where the first boy cut it through.

It is a work requiring great patience and perseverance, and may be thought by many as an expensive mode; but in plantations such as ours, where the ground is literally carpeted with ivy, it is of little use removing it from the trees without to some extent clearing the ground around each.

That ivy luxuriates so here can only be accounted for by the humid atmosphere being congenial to its growth, this estate being both mountainous and maritime.

*Penrhyn Castle, North Wales.* ANGUS D. WEBSTER.

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SIR,—IN former numbers of this *Journal* I have noticed several letters relative to the growth of ivy on forest trees, whether it is injurious to their growth, or whether it serves as a protection against severe winters, or whether it materially interferes with the full development of the trees. On these points I wish to make a few remarks. Ivy is a climbing plant growing on the sides of walls, houses, along poles and such places, more especially if the place is cool and moist, sending out numerous small spongiole rootlets; these insinuate themselves between the crevices of a wall, or become attached to the stones themselves, and with the action of dampness they gradually crumble the stone to dust. Such instances may be seen on many old castles, towers, or walls. Their action upon trees is somewhat similar, although in the case of the larch the roots or tendrils catch easily in the crevices of the bark. Other deciduous trees generally possess a smoother bark, yet its development on such trees is very rapid, and very injurious to the future welfare of the trees. In thinning a plantation or woodland the first thing considered is to give more room for a free admission of air and light to circulate through the wood to carry off all superfluous gases or fungoides which may be floating in the air; also to give the stem a free admission of light and air, which keeps the bark in a clean and healthy state. The bark acts as a protection to the wood from external accidents; it is also the medium in which the proper juices are elaborated and brought to the state peculiar to each species. In the case of trees being clad with ivy this important function is impaired, and by excluding light and air, tends also to reduce the temperature. Numerous insects, such as slugs and earwigs, harbour among the leaves, all which are of no benefit to the tree, and in young woods and young ornamental trees the presence of ivy should not be tolerated, for whatever it may protect the bark from it has no effect on the young shoots, and most of our more hardy forest trees have a coating of bark sufficiently thick to protect the stem of the trees from injury by frost, perhaps with the exception of larch, which in severe winters are liable to get chilled, causing chilblains and running sores. As regards old or matured trees it might be introduced to form an ornament, as in this case it would be some time before it came to be of any serious consequences to their health. But its presence should not be extensively encouraged on any trees. It generally masters its subject through time causing the sap to flow less freely, and the tree to become of a dropsical condition, assuming the autumnal tint very early, and causing the tree to die from the top downwards, eventually dying altogether. Removing the ivy from such trees may be done almost any time from spring till autumn, by cutting it three to four feet from the ground, then tearing it back from the tree and also along the ground, also taking another cutting further up the bole if you choose, and leaving the rest to die on the tree; it may be some little time before it is got rid of, as it is not easily killed. Last winter the rabbits peeled many fine plants, but they have suffered very little besides, unless it may be some of he young shoots killed by the severity of the frost.

ROBERT COUPAR,
*Kinnaird Castle, Brechin.* *Assistant Forester.*

## THE APPARENT DESTRUCTION OF THE *WELLINGTONIA GIGANTEA.*

SIR,—This magnificent tree seems to have fallen in for a full share of the injury which has been inflicted this summer upon almost all kinds of trees, whether deciduous, evergreen, or conifers, by the different insect tribes. There are a few fine specimens of the *Wellingtonia gigantea* on the Wortley Estate, the seat of the Earl of Wharncliffe, varying in height from five feet to thirty feet, the lesser portion of which are still in the nursery grounds. About the beginning of last month my attention was attracted by the appearance of the tips of the branches, which, as well as the leading shoots, were drooping and turning brown. On carefully examining the trees I found them infested with a kind of spider, rather transparent, and which, in my opinion, is the cause of the disease, each family being carefully protected from the wet and cold by a well-woven covering of insect wings and bodies, small leaves, &c., about the size of a lady's thimble. These coverings varied in number from two to six on each tree; some of them enclosed a greenish-looking egg, in the centre at the top, the old spider sitting underneath it, no doubt in the act of incubation. Some of the habitations or coverings are attached to the stems, others hanging underneath the branches, which were each occupied by a family of young ones, varying in number from six to twelve, as far as I could ascertain, about the size of a small shot corn, each tent being well protected from their stronger enemies by massive webs. My first object was to cut off the branches most affected, and destroy as much as possible the holds of the invaders. I have since applied three or four solutions of paraffine and water, but with little effect. I am now trying a similar solution of soft soap, and sprinkling the ground with lime, which I hope may have the desired effect. The *Pinus nobilis, Nordmanniana* and the *Austriaca* have all slightly suffered from the same cause. This pest, I fear, is general, as I have seen it in the neighbouring woods and nurseries.

Perhaps some of your readers will say if this is so, also what remedies they apply.

I send you by post a small tin box enclosing a few of the spiders and their tents, likewise a few twigs of the *Wellingtonia*, so that you may see how the trees are attacked. I should be glad to learn the name of the insect.

*Wortley.* GEO. PARKIN, *Forester.*

## HOW TO MAKE BROWN OAK.

A GOOD method of producing the peculiar olive-brown of old oak is by fumigation with liquid ammonia; the method has many advantages beyond the expense of making a case or room airtight, and the price of the ammonia which does not cost a penny in labour. It does not raise the grain, the work keeping as smooth as at first. Any tint, or rather, depth of colour, can be given with certainty; and the darker shade of colour will be found to have penetrated to the depth of a veneer, and much further where the end grain is exposed, thus doing away with the chance of an accidental knock showing the white wood.

The colouring is very even and pure, not destroying the transparency of the wood. It is advisable to make the furniture from one kind of stuff, not to mix English oak with Riga, and so on. They both take the colour well, but we believe there is a kind of American red oak that does not answer well. In all cases care must be taken to have no glue or grease on the work, which would cause white spots to be left.

The deal portions of the work are not affected in the least, neither does it affect the sap of oak. The best kind of polish for furniture treated in this manner is wax polish, or the kind known as egg-shell polish.

The process of fumigation is very simple. Get a large packing-case, or better still, make a room in a corner of the polishing shop about nine feet long, six feet high, and three feet six inches wide; pass paper over the joints; let the door close on to a strip of india-rubber tubing; put a pane of glass in the side of box or house to enable you to examine the progress of colouring.

In putting in your work see that it does not touch anything to hinder the free course of the fumes. Put two or three dishes on the floor to hold the ammonia; about half a pint is sufficient for a case this size. The ammonia differs in purity, some leaving more residue than others.

Small articles can be done by simply covering them with a cloth, having a little spirits in a pot underneath.

A good useful colour can be given by leaving the things exposed to the fumes overnight.

The colour lightens on being polished, owing to the transparency thus given to the wood.—*Cabinetmaker.*

*[The Editor desires to call attention to several questions in recent numbers, which remain unanswered, and hopes that practical readers will assist in maintaining the usefulness of this department.]*

## QUESTIONS.

67. Manure for Holly.—Would you kindly let me know what sort, if any, manure should be applied to a holly which was planted on a lawn three years ago, but which has made hardly any growth yet? Soil gravelly. —Holly.

[Any well-made farmyard manure, in a thoroughly decomposed state, may be applied to the holly with good effect. See that the plant has not suffered from want of water in such an open soil. Mulch with the manure, and water well in dry weather, and if the holly retains a fair amount of vitality, it will soon repay the extra trouble.—Ed.]

68. Creosoting Posts.—Can you give me a recipe for creosoting the posts and stakes of a wire fence? also its cost?—H. P. P.

69. Value of Brake Fern.—I should like to know the manurial value of brake fern used as litter, as compared with that of straw.—H. Penry Powel, *Castle Madoc, Brecon.*

70. Silver Fir.—What is the ordinary rate of growth of the silver fir in this country under favourable conditions? I measured one twelve years ago, and I find it has increased twelve inches in girth since that time, the girth in 1868 being five feet seven inches, and in 1880 six feet seven inches.—J. B.

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The Growth of Wellingtonia.—I measured one of these trees a few days since, which was planted on the day of the marriage of the Prince of Wales, March 10th, 1863. Its circumference 6 inches above the ground is 9 feet 7 inches. This seems to me to be very remarkable. An oak would be growing 150 years before it attained such dimensions. It has often occurred to me that owners of large estates would do well to cultivate this giant, as I apprehend the wood would be useful for building purposes. The tree is also very ornamental. An evergreen avenue or approach to a mansion, for instance, would be easy and of quick accomplishment. The tree referred to is in the parish of Hinton, Berks.—Thomas Moss, *in "Journal of Horticulture."*

# THE HOME FARM.

## OPERATIONS FOR OCTOBER.

This month may be considered the commencement of the agricultural year, and upon the quality of the work now performed the success of the crops will very much depend. The work should be kept well in advance of the season, and by this means a good tilth and a proper seed-bed may generally be secured, followed by an early harvest.

*Steam cultivation* and cleaning should continue as long as the weather permits, weeds being at once burnt up or carted away. After the land has been prepared for tares, rye, winter beans, and oats, ploughing for wheat, mangolds, carrots, parsnips, potatoes and swedes may next proceed. Upon most well-cultivated and moderately light land, crops of tares or rye, trifolium and Italian rye-grass, or other forage plants, may be taken from the land intended for white turnips, or even for swedes. The steam plough may often be used with advantage when the land would be very considerably injured by horses.

*Rotation of Crops.*—This must be regulated by the quality of the land, and much may generally be learnt by watching the custom of the country. The old three-course system of wheat, then beans, oats, or clover, followed by a bare fallow, was better adapted to times of low-rents, cheap labour, and high prices of cereals, than to the present age. Upon the poorer clays we still find rotations commencing with fallow (either bare or cropped), wheat, then beans, oats, or clover. On better clays, fallow for the root crops, then wheat, beans, wheat, oats or clover. Upon the lighter soils barley and turnips occupy prominent places in the rotation. Upon the heavier clay lands, tares, rape, rye, cabbage, kale, kohl-rabi, and the earlier white turnips, may be grown with advantage, and fed off before winter. Liebig's theory of the exhaustion of the soil by a succession of similar crops is the basis of an intelligent rotation. Plants requiring precisely the same kinds of food require to be separated by long intervals of time; deep rooting and shallow rooting plants should also alternate, such as wheat and barley. Cereals requiring large supplies of silicates, such as wheat, should be followed by those which take much less out of the soil, as beans. The common Norfolk rotation of four courses, varied or extended according to the requirements of the land and the mode of farming, is one of the most scientific in its principles. This consists of—1, root crops; 2, barley; 3, clover; 4, wheat. The thorough cultivation of the land and a liberal manuring of the turnip crop form the foundation of the whole course. The fine tilth generally obtainable after turnips insures a good crop of barley. The clover sown in this keeps down the smaller weeds, and the large bulk of roots left by the clover supplies the wheat crop with an abundance of nitrogenous matter. When the land shows signs of exhaustion the clover is allowed to remain for two years, and when the barley is liable to grow too luxuriantly wheat is taken after the turnips, and followed by barley, the latter being in consequence much better in quality.

*Seeding.*—The selection of seed is a matter of vital importance. New wheats germinate quicker than old, and are generally preferred; but the straw from old wheat will be stiffer though shorter, less subject to become winter proud in mild weather, more free from mildew, longer in the ear, and more valuable in the grain. Thick and thin sowing are alike advocated. Hewitt Davis grew his heaviest crops from one bushel of seed. Mr. Hallett used from a peck to a bushel, according to the time of sowing. Too much seed is a common custom. From 6 pecks to 2 bushels should never be exceeded. Broadcasting, dibbling, and drilling have all their advocates. The first requires the most seed and the second entails the most expense in labour. Drilling is now all but universal. Rye and tares, winter beans and oats should already be in; winter barley may follow. For forage the latter is the best, especially if sown in September. For the prevention of smut in wheat nothing proves more efficacious than a solution of blue vitriol, about 1 lb. to 6 bushels of grain.

*Hop-gardens.*—The stripping and stacking of poles should be the first consideration; next come the renewal of poles, and carting off old poles and bines. Manure should be carted on while the gardens are sound. Heavy lands may be kept rounded up during the early part of the winter, lighter ones being struck out before the poles are stacked, and afterwards slip-dug. When the lighter land is dug too early it is apt to run together after frost, and work unkindly in the spring. Prepare new grounds for planting bedded sets in November.

*Root Crops.*—Potato digging should not be deferred later than the first week in October. Where they are much affected by disease, the portion for eating may with advantage be kiln-dried. Secure mangolds before frosts touch them. Care should be taken not to injure them in raising, nor to cut off either the top or the roots too closely. Let them remain for a week or more in the heaps covered by their tops Afterwards clamp them and cover closely with soil, giving them ventilation at the top by means of a few drain-pipes. Carrots should not be too closely covered. The white Belgian stands a mild winter tolerably well if left in the ground. Upon peaty soils rape may now be transplanted for spring feeding.

*Fruits.*—The later kinds will now be fit for gathering, and these should be picked as soon as they part readily from the branch. Cider and perry fruits should be collected as they fall, and stored under cover, being ground up as they become mellow.

*Live Stock.*—Farm horses will now be hard worked, and they should have their full allowance of corn. Weaned colts will require to be sheltered by night. Fatting beasts still kept at grass will want an increased allowance of cake, and all young stock should be well sheltered as frosts set in by night. Ewes may be put upon rape or have turnips, either upon the stubbles or the meadows. The rams may be turned in with these by the second week in October. Tegs upon turnips will require some dry food, and afterwards cake or corn. About 2 lbs. of cut chaff and 1 lb. of malt combs per head per day will be found useful. Some salt should always be within their reach. Carrots or Swedish turnips, with a mixture of cut clover and oat straw, will be a good feed for horses. The consumption of crops will be as follows:—rape or cole, white turnips, hybrids, swedes, mangolds, cabbage and kale intervening throughout the autumn, winter, and spring, according to the time of sowing or planting out. In feeding stock of all kinds for market, a combination of fat and flesh forming ingredients should be used. Thus either 8 lbs. of beans or 6 lbs. of linseed will produce, when given separately, 1 lb. of meat; but given together they will produce 4 lbs. instead of 2. Pulping is by far the most economical plan of giving roots. If mixed in the proportion of ½ cwt. of roots to 3 bushels of chaff, it may be given at three feeds during the day, with an allowance of cake. By allowing the mixture to lie for about twenty-four hours fermentation takes place, inferior hay becomes sweetened, and the straw softened. Choking and hove are both prevented by using pulped roots. Pigs may also be fattened rapidly upon a mixture of pulped and fermented roots mixed with meal.

*Irrigation.*—All carriers should at once be cleaned out, hatches repaired, and everything got into readiness for taking advantage of the first floods on the brooks and rivers. Water should not be laid on during frost, but if frost sets in while the meadows are covered the flooding should not cease. Crops of aftermath are sometimes taken from water meadows early in October, and the hay is found valuable for dairy cows. But from the uncertainty of the weather at this season of the year it is generally best to graze them.

*Dairy Cows* will require housing by night towards the end of the month. Pastures overshaded with elm and ash trees are unfitted for them as soon as the leaves begin to fall, as the cows devour these greedily to the injury of the butter. An allowance of cake, brewer's grains, cabbage, or even turnips may be given them. The last cut of comfrey will now be found useful.

*Poultry.*—Turkeys should be put up to fatten, and they should have access to some grit or fine gravel. Geese may still frequent the stubbles. Ducks will require forcing food.

*Miscellaneous.*—Trim hedges and clear watercourses, catch moles, salt rough pastures, and stock them heavily; sow tares for a second cut in spring, thresh out oats, peas, and wheat as required, storing the chaff, and either imbarning or well thatching the straw.

*Estate Work.*—The horses will have little time for this until the wheat sowing is completed. A spare horse may, however, be profitably employed in carting leaves as these drop off and can be collected.

B.

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## COMMEMORATIVE TREE PLANTING.

ON Friday, May 21, the Lord High Commissioner to the General Assembly, Lord Rosslyn, accompanied by the Countess of Rosslyn, Misses Maynard, Sir Arthur Halkett, Captain Baillie, Dr. Hamilton Ramsay, and Mr. Ellis, drove to the Royal Botanic Garden, where it had been arranged that his lordship should plant a tree in commemoration of his visit to Edinburgh. They were received at the entrance by Mr. Sadler, Curator of the Garden, and being subsequently joined by the ex-Regius Keeper, Dr. Balfour, were conducted to the terrace in front of the range of conservatories, where Mr. Sadler had made preparations for planting a fine specimen of *Libocedrus decurrens* the white cedar of California. The tree in question is a noble evergreen conifer, found along the banks of the Columbia River and on the Californian mountains, where it attains the height of 140 feet. The Lord High Commissioner having duly performed the ceremony of planting, and filled in a considerable quantity of soil, a garden watering-pot was handed to Lady Rosslyn, who bestowed its contents upon the young fir; his lordship remarking that he had played the part of Paul, and her Ladyship that of Apollos, but the increase must come from a higher hand. The tree thus added to the ornaments of the garden comes in as a companion to that planted last year by the Countess of Rosslyn—a specimen of *Retinospora obtusa* the Tree of the Sun of Japan —which, it may be mentioned, has thriven most satisfactorily. At the close of the ceremony, which was witnessed by a considerable number of people, the Lord High Commissioner and party visited Mr. Sadler's house, where they saw the famous sea-anemone, "Granny," which has been in the same glass jar for the last fifty-two years.

# THE MENAI SOCIETY OF NATURAL SCIENCE AND LITERATURE.

SIR,—The members of this society had their third excursion of the season on Thursday, the 19th August, to Caerhun, near Conway, the residence of Mr. Griffith, beautifully situated on the banks of the Conway River, where a very pleasant day was spent in viewing the many rare objects of botanical as well as antiquarian interest to be seen at that place.

What may specially interest the readers of this Journal is the description and measurements of some fine old trees, greatly admired by the party. The first of these was a noble specimen of the oak (*Quercus sessiliflora*) which on measuring I found to be 15 ft. 3 in. in circumference at five feet up.

Growing outside the garden walls is a line of old cedars of Lebanon, their appearance indicating perfect health, and bearing an unusually large quantity of cones, the largest measuring 12 ft. 1 in. in circumference at three feet from the ground. Growing in close proximity to these is a good specimen of the cluster pine (*Pinus pinaster*), which at three feet up measures 14 ft. 3 in. in circumference.

Prettily situated at a short distance from the mansion-house is the old church of Caerhun, in the churchyard of which stands in vigorous old age a venerable yew tree (*Taxus baccata*), measuring in circumference at three feet up, 18 ft. 6 in., and supposed to have been planted at least 1,300 years ago.

Close to the churchyard are several holly trees (*Ilex aquifolium*), the largest of which, though in a semi-living state, and denuded of many branches, still measures 9 ft. 10 in. in circumference at three feet from the ground.

Those engaged in antiquarian research next examined the site of a Roman villa: the main walls are still standing a few feet in height, and in a comparatively good state of preservation. A specimen of the short pillars used in Roman hypocausts was on examination found to be Denbigh stone. Immediately above is the Roman camp, where the members noticed with admiration how perfectly the line of circumvallation was still to be made out. It was called Conovium, and covers a square of 60 ft., being for a long time the head-quarters of the 10th Legion.

Here one of the members exhibited various coins, also several drawings illustrative of Roman masonry and tile-work, at the same time giving a short historical sketch of the life and achievements of Ostorius, the Roman governor.

In the mansion several Roman and Celtic antiquities were inspected, the principal being an ancient shield or targe, of unique design, that was found in the neighbourhood, about the end of the last century; but antiquarians are divided in opinion as to whether it is Roman or Celtic, as nothing exactly similar exists. A vote of thanks was then given to Mr. Griffith for his kindness in throwing open his grounds for the inspection of the Society, and all returned seemingly delighted with their day's outing.

*Penrhyn Castle, North Wales.* ANGUS D. WEBSTER.

# Planting Moorland.

In some remarks that we made in a recent article in the *Field* on moore-edge farming it was shown that, whilst only exceptional portions could be reclaimed and brought into cultivation or converted into pasture, there was a great deal of at present profitless land that might under certain circumstances be planted, and made to produce eventually a considerable revenue. We have lately had an opportunity of inspecting work of this sort, which promises to be very remunerative; and, as there are some features of special merit in the processes pursued, we shall on the present occasion describe the details of management. These plantations are on the Ebberston and Brompton estates of Sir Digby Cayley, Bart., in the North Riding of Yorkshire. That to which particular reference will be made comprises a tract of moorland of about seventy acres, which was planted in 1869 and 1870, the process being described in an essay which appeared in the *Journal of the Highland and Agricultural Society of Scotland* in 1872, for which the author, Mr. Joseph Bradley, who had the management of the work, obtained the Society's medium gold medal. The great difficulty at Ebberston, as elsewhere, was in the existence of a bed of moorband pan, generally at a few inches from the surface, and which interfered with drainage; indeed, the water which fell on the surface could only pass away by evaporation, and all attempts at planting must necessarily fail, because the roots of the trees could not exist in stagnant water. The secret of success is to break up this pan, and allow the water to sink into a porous subsoil. The land in question is situated on a high ridge between two valleys, which run north and south, ten miles from the sea, and about 610 feet above it. The surface soil is black and peaty, about three inches in depth, and originally covered with stunted heather. Below is a hard gravelly soil, 2 in. to 1ft. in depth, which rests on the moorband bed. The latter has been probably produced by water acting on iron. Below this pan is a yellow sandy subsoil resting on oolite limestone. The first business is to burn the heather, and from the experience gained, it appears desirable that this should be done two or three years before the planting, so that the young heather may be 3 in. or 4 in. high as it then affords considerable shelter to the newly planted trees. This having been done in spring, furrows about 2 in. deep by 9 in. wide are thrown out, 4 ft. apart. The soil is got clear of the opening by an ingenious addition of a second coulter to the plough. In Mr. Bradley's words: "Each furrow slice we tried fell back into the furrow when the plough passed on. In order to obviate this difficulty an additional coulter was fixed on the opposite side of the beam, the point of which descended to the wing side of the share in a parallel direction to, and nine inches apart from, the other coulter. By this contrivance the furrow slice, which is nine inches wide and two inches deep, is completely cut out, and falls on the unploughed land."

Two men are required, and a pair of strong horses; for, though the furrow is so shallow, the roots of the heather make it very tough work. In a day of seven and a half hours about four acres can be got over. The next operation is to follow the plough with a subsoil plough, which breaks up the moorband pan, and loosens the soil under it. We believe the implement for this purpose was home-made, and answers so admirably that not only the band under the furrow is broken, but all between the furrows is disturbed; and the proof of this is the fact that after the operation no water stood anywhere on the surface, even after the heaviest rain. Moreover the men who were leading the horses engaged in the work felt the ground between the furrows rise up and crack. This is Mr. Bradley's description of the plough:—

"The handles and beam consist of oak, with a body of wrought-iron steel. The coulter is partly of wrought iron and partly of steel, made perfectly hard. The sock is of cast-iron, chilled on the under side and soft on the top side: one of these socks, if sound, will last one day. The beam, which is 5½ in. by 8 in. at its junction with the handles, and gradually tapers off towards the end of the plough to 4 in. by 4½ in., is made of sufficient length to admit of additional appliances for cultivation. At each end of the beam there is a strong wrought-iron lever, and two metal wheels on the framework of each lever about 2 ft. 6 in. apart, which run on the surface of the ground; they are so regulated as to allow the plough to go into the ground from ten to eighteen inches, and greatly assist the men in directing the plough when at work, or when sitting in the plough at the ends of the furrow, or when raising it out of the ground. By means of these levers also, when the progress of the plough is arrested by foot stones, the plough is drawn backwards, and is thus more readily free from the obstruction, for the plough is not only drawn backwards, but is also lifted to the surface; thus it glides over the stone, and, the levers being let go, again descends into the ground of its own accord. There is also a rack-pinion at the extremity of the plough, which carries a strong cast-iron wheel, and assists the front lever when required. The beam and handles are stropped together with strong wrought-iron plates and bolts."

Originally this plough was drawn by six powerful horses, four men being required to hold and drive. Now, and for some years, the horses have been replaced by four very powerful oxen of shorthorn type. Their great strength, steadiness of draught, and placidity of temper render them highly efficient draught animals. Three men only are required, so there is no doubt the bullocks pay, because celerity of operation is of less importance than thoroughly efficient work. These bullocks are kept almost entirely at this work throughout the spring and summer, and when not so employed are useful for loading walling stone, &c. When six horses were used it was calculated that in a day of seven and a half hours about three and a half acres could be subsoiled. The land was then left during the summer, becoming somewhat consolidated, and in the autumn a kind of drag, with three tines and a front wheel six inches wide, was used for further pulverizing the soil, towards which the compression by the advanced wheel was very beneficial. The tines are arranged so as to penetrate twelve inches. This is described as a very valuable implement. One man with two horses can do six acres a day. In order to plant the seventy acres twelve men and seven boys were employed, one boy waiting on two men, and the odd lad bringing plants as required. Each man, armed with a short-bladed spade, made an insertion in the ground in a slanting direction, and then lifted up the soil with one hand sufficiently to allow of his placing the root of the plant in the cavity with the other; the spade is then withdrawn, and the soil falls upon the roots, which are planted deeper by two or three inches than they have been in the nursery garden. The workman then places his foot on the soil and presses it down firmly upon the roots, taking care to draw the plant upwards to within half an inch of its original depth in the nursery garden. The object of thus raising the plant is to straighten the roots. The next operation consists in taking the soil which was thrown out by the plough, chopping it, and pressing it round the plant. Mr. Bradley states that each man averaged 750 plants a day, and that in February, when the weather was open, each man planted 1,000 a day. Care was taken to make the plants in the different rows intersect each other. Plants were never placed opposite to each other.

It is important to know what kinds of trees were used, and at what stage of growth. The whole area required 157,200 of larch, 25,350 Scotch firs, and 2,000 Corsican pines—total, 184,500. On the north side the Scotch were most plentiful, in order to secure shelter. The trees were one year's seedlings, one year transplanted, and replanted into Sir Digby Cayley's nursery for a year. Though not very big, they had splendid roots, and, with few exceptions, have done grandly. Here and there one comes upon a stunted plot; but on inquiry it always turned out that the drainage was imperfect, owing to the place being so deep that it had escaped the implement. The number of dead trees over the seventy acres, when Mr. Bradley wrote, was only 3,000; and this, in the face of the dry season of 1870, is not a little remarkable.

We have already described the generally healthy condition of the plants which are now safe as regards weather, and in a few years will need thinning. Mr. Bradley gives particulars of cost, by which it is shown that the total cost per acre, without fencing, is only £3 1s., thus made out:—

| | £ | s. | d. | |
|---|---|---|---|---|
| First ploughing | £0 | 3 | 3 | per acre. |
| Subsoiling | 0 | 10 | 0 | ,, |
| Cultivating furrows | 0 | 1 | 11 | ,, |
| Labour of planting | 0 | 11 | 10 | ,, |
| Trees | 1 | 14 | 0 | ,, |
| Total | £3 | 1 | 0 | per acre. |

The fencing is an important question, and there is another point of equal importance, viz., the keeping down of rabbits during the first year of growth; this is essential, and if the vermin cannot be destroyed, the whole plantation must be protected by wire netting. This is, however, very costly, and should, if possible, be avoided. In this plantation decoys are made, which are very effective. The rabbits are fed in an enclosure, to which they have access by a wooden subway through a bank; in the centre of this is the trap, *i.e.*, a part of the floor is hung on a pivot. When the rabbits are quite familiar with the run, and use it freely, the trap is put into play. Underneath the trap is a well; each rabbit as it comes along is tipped by its weight into the well, and thus caught. Irrespective of the rabbit, we much prefer the shelter of a stone wall to any other kind of fence, and this is to a certain extent a protection against rabbits. It, however, costs more than strained wire or netting. According to Mr. Bradley's calculations, which are founded on actual experience, whilst stone walls 4 ft. high cost about 9s. 9d. per rood, or in this case £1 17s. 9¾d. per acre, wire fencing and netting are under 30s. But when shelter to the young trees is important, the advantage of the wall is very considerable. We are quite satisfied from what we saw that moorland treated in the way we have described can be made to yield a considerable revenue, and that all those who are owners of moors should test for themselves the advantages of the process which has been recommended. A certain amount of plantation, especially on steep banks, must act as a desirable shelter for grouse.—*Field.*

## THE FRUIT CROPS.

After the terrible year 1879, and the scarcely less disastrous spring of 1880, it was hardly to be expected that we should have a good fruit year. Our uncertain climate should lead those who advocate the extension of fruit culture to pause ere they embark too largely in what, in the face of ever-increasing foreign competition, may prove as unfortunate as wheat or hop culture. In fact, glancing through the returns with which we have been favoured, it is obvious that, while small fruits and strawberries have been generally abundant and good, there has been a general failure in most other cases. Apricots were almost an entire failure; plums were about half a crop, the returns being nearly evenly balanced; cherries have been more plentiful than we should have expected—our country friends must have eaten them all, for not many appeared in our markets; peaches and nectarines outdoors have been almost entirely absent, apples are not much better; pears are conspicuous by their absence, and nuts are not much better. Under the circumstances it is best to look forward rather than backward, and the fine weather we are now experiencing gives hopes for next year. Let us hope spring frosts will not blast this fair promise.—*Gardener's Chronicle.*

# WHEN TO TRANSPLANT *MAGNOLIA GRANDIFLORA*, THE TULIP-TREE, &c.

Mr. Knight is quite right in stating the month of June to be the most favourable time for transplanting the magnolia. So convinced am I of the danger of moving this tree during the winter or in early spring, that rather than do so I would wait until growth had fairly commenced. Those who visited the Paris Exhibition of 1867 may remember to have seen some large magnolias in the *jardin reserve*, some of them healthy and full of fine foliage, others equally large, but presenting a meagre appearance. The latter were planted there in March, the former early in the summer when the weather was hot. These latter suffered little from removal; the early planted ones, on the contrary, dropped a great portion of their leaves. At the same time I know that many planters in France are equally in favour of transplanting just as growth ceases, while root-action is still lively and the soil still warm. The roots then grasp the earth and get good hold before winter sets in. The reason why so many late autumn and winter planted trees die is simply because severe continued frosts and harsh drying winds, such as are often experienced in early spring, dry out the sap at a much more rapid rate than the roots—which, owing to the late removal, are in a more or less torpid state—can supply it; with the consequent effect that in the case of evergreens the foliage shrivels and drops off. This fact, simple though it may be, is often lost sight of by those engaged in the transplanting of trees and shrubs, although many are fully aware of its importance. Amongst others I think Mr. W. Paine, who, if I remember rightly, not long since expressed very decided opinions upon this matter in a contemporary. As bearing upon this subject I may mention that in many parts of Germany it is the custom to transplant all evergreens in the month of August, no matter what the weather may be. Each plant is puddled in, and the per-centage of death is very small indeed. The winter being so severe there renders it imperative that all transplanting should be accomplished in time to allow of the roots getting firm hold of the soil before hard frost sets in. With respect to the tulip-tree, if your correspondent who has failed to establish it will go to a nursery at the fall of the leaf, have his trees carefully taken up and the roots enveloped in litter, bring them home with him, damp the roots on arrival, and plant at once, I will engage that not one of them fails to grow.—J. Cornhill, in "*Gardener's Chronicle.*"

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**Death of a Royal Tree.**—The *Wellingtonia gigantea*, which was planted at Wortley Hall by her Majesty during her visit to Manchester in 1857, has fallen a prey to the hard winters. For several years, with great care, it flourished, and it attained a considerable height. The English oak planted near it on the same occasion by the Princess Royal is a healthy, vigorous plant, and has reached about 25 ft. high.

## COMMON QUICK, OR HAWTHORN

A WRITER in a recent number of our able contemporary, the *Gardener's Chronicle*, in describing the extensive Nursery of Messrs. Perkins & Sons, at Kingsthorpe, Northampton, thus refers to the immense quantities of common quick, or Hawthorn, raised in that nursery. "In 1875—a good year for tree and bush seeds of all kinds—as many as 1,250 bushes of haws were obtained and sown: and it is worthy of note that the crop has been an indifferent one since. This large quantity was obtained from extensive Crown lands in the county of Northampton, and there are always those who gather the berries in the proper season and sell them to the growers. In a season like that of 1875, when the berries are plentiful, they can be purchased as low as 1s. per bushel, but when they are at all scarce prices rule higher. The berries are procured in autumn, and then buried in pits in the same way as potatoes, after being well turned over previously, to cause them to rot. This is done to induce germination: the shell, being very hard, has to be softened before the cotyledons will issue from it. From one to two millions of plants are raised annually, the crop being regulated by the quantity of berries obtained.

In the nurseries Hawthorn is transplanted when one year old, and sold when two or three years old; what is unsold in the third year is again transplanted. When young the Hawthorn grows very rapidly, if planted in good ground. Its rapid growth makes it useful for hedgerows, and if well pruned and kept down when young, it quickly grows into a thick and intricately woven hedge. When it arrives at the height of a tree, however, it makes wood very slowly, and lives to a great age. Its beauty and picturesqueness, as conducive to a charming feature in the landscape, entitle it to high consideration. It is of a dense leafy growth; its snowy blossoms are often produced in such quantities as to completely whiten the whole head of the tree, and which in the case of the common, as well as of some of the choice sorts, have a delightful perfume, while in autumn and winter the ruddy crimson-coloured haws give the plant a rich and glowing appearance in our forests, open glades, and thickets. It is largely planted as covert for game.

"The English Hawthorn," remarks Mr. A. J. Downing, in his book on "Landscape Gardening," "is not only a beautiful small tree, but it is connected in our minds with all the elegant poetic and legendary associations which belong to it in England, for scarcely any tree is richer in such than this. With the floral games of May this plant, from its blooming at that period and being the favourite of the season, has become so identified that the blossoms are known in many parts of Britain chiefly by that name. Among the ancient Greeks and Romans they were dedicated to Flora, whose festival began on the first of that month, and in the olden times of merry England the Maypole, its top decked with the gayest garlands of these blossoms, was raised amidst the shouts of the young and old assembled to celebrate the happy rustic festival." One variety, the Glastonbury Thorn, which in favourable seasons and situations blooms as early as Christmas, and in January or February, is well known because of the popular legend attached to it by the monks of the dark ages.

## THE AMERICAN WILD BLACK CHERRY.

(*Prunus serotina*, Ehrhert.)

MY attention has been called to the capabilities of this tree for economic planting, by finding it growing at various points on the New England coast, in the most exposed situations, in the poorest soil, and often within direct influence of the salt spray. A tree that grows spontaneously and with considerable vigour in such situations can be cultivated with success in almost any portion of the United States, within its natural range, whatever the soil or the exposure.

Naturally the Wild Cherry extends over a wide territory; it is found from the Great Salt Lake in the north (Richardson) to Florida, and from the Atlantic to the Mississippi. Through all the northern and middle States it is a common forest tree, but in the rich lands watered by the Ohio and its tributaries the Wild Cherry attains its largest size and develops its best qualities, and it is still not uncommon to find in the less thickly settled portions of the west specimens 80 to 100 feet high, and from 3 to 4 feet in diameter. A slow-growing tree on the poor soils of the seaboard, the Wild Cherry increases with great rapidity in the rich, deep lands which it prefers. An examination of the many specimens cut from trees growing in Northern Illinois, and in other portions of the west, shows an average annual increase of wood of over half an inch during the first twenty years; beyond that age, the growth is naturally less rapid; but on his point I am unable, from want of sufficient material, to speak with exactness.

The wood of the Wild Cherry is comparatively light, the specific gravity of the dry wood being but ·454, while that of Black Walnut, equally dry, is ·539 (the average of two specimens), or eighteen per cent. heavier. It is close-grained, compact, and not liable to warp. Of a dull, light-red tint, which deepens with age, it in time almost rivals the best mahogany in colour. For these qualities, and because it works easily and advantageously, the wood of the Wild Cherry is highly valued by the cabinetmaker. It is also now largely used for interior finish; and it is the only American wood employed in making what is known as "ebonized" work, that is, furniture dyed black in imitation of ebony. Cherry is still considered the best wood for window-sashes. The application of Wild Cherry to the finish of expensive interiors is of but recent date, and promises a large demand for this wood; while for cabinet-making the annual consumption is rapidly and steadily increasing, although still far behind the more popular Black Walnut, which, in spite of its sombre colour, still supplies the material for fully three-quarters of all the hard-wood furniture made in the United States.

The following table of the actual prices in the Boston market of the principal American woods employed in cabinet-making, will show the comparative estimation in which they are held, and will furnish an intimation of the probable supply of first-class material for this purpose:

| | | | | |
|---|---|---|---|---|
| Black Walnut | 75 | per | 1,000 | feet. |
| White Oak | 65 | „ | „ | „ |
| Cherry | 69 | „ | „ | „ |
| Butternut | 50 | „ | „ | „ |
| White Ash | 40 | „ | „ | „ |
| Sugar Maple | 40 | „ | „ | „ |

The wood of the Wild Cherry when dry burns well, without snapping, but it is soon consumed, and from its lightness is inferior to nearly all American hardwoods commonly employed as fuel. In heat-giving qualities Hickory, the American standard, is eighty-four per cent. its superior. The amount of ash left after Wild Cherry is burned is remarkably small, being only eighteen-hundredths of one per cent. of the weight of the dry wood consumed.

The facility with which young plants of this tree are raised from seed, the ease with which they may be transplanted, their hardiness, rapid growth, and power to resist rough usage render the Wild Cherry a valuable subject for forest-planting on a large scale; while the great and increasing demand for the wood ensures a certain and profitable sale for all that can be raised.

In many portions of New England the Wild Cherry can be successfully cultivated, and wherever the soil is moderately deep and rich, it will be a safe and profitable tree to plant.

In the middle and western States it will, I think, be found one of the most satisfactory and useful timber trees that can be employed in forest planting, and, although not a native of the States beyond the Mississippi, its great hardiness and adaptability to various soils lead me to hope that the Wild Cherry will succeed in the treeless regions of Kansas and Nebraska as well as the less valuable trees which have generally been planted there.

The fact that the Wild Cherry is the favourite home of the American tent caterpillar, which preys on its foliage, and, unchecked, finally injures its growth, is the one serious drawback to this tree. Great as this objection is, it will disappear before energy and concerted action.—C. S. SARGENT, Harvard, U.S.

*Round about a Great Estate.* By RICHARD JEFFERIES. London: Smith, Elder, and Co.

ANOTHER welcome and thoroughly enjoyable book from the fertile pen of the author of "The Gamekeeper at Home," a writer who in all his works displays a close acquaintance with the home life of country folks, and an intimate knowledge of the fauna and flora which inhabit our woods and our country lanes and hedgerows.

The title of the work might raise our expectations to descriptions upon a somewhat grander scale than those which are here presented; but for correctness of detail and faithfulness of delineation the book is unsurpassed. To those accustomed to a country life we can scarcely conceive a greater treat than a quiet perusal of its pages, such as we have enjoyed, while wandering through the meadows, along the brook's side, and upon the outskirts of the woodlands. Every page recalls, in its allusions to the songs and habits of birds, the beauty and the profusion of wild flowers, the changing forest and park scenery, and the habits and customs of villagers, the recollections of boyhood.

One of the most prominent characters of the book is Hilary Luckett, of Luckett's Place, an independent, good-natured, business-like, and keen-witted yeoman of the last generation, who inveighs strongly against the growth of the "beggarly wuts," at the same time that he is making a good round sum of money every year by supplying them to the adjoining racing stables; bets his "modest fiver" on the horse carrying his country's colours; lifts a sack of corn or a pail of milk in his teeth; and has the reputation of never allowing any part of a partridge once placed before him to be carried from the table, for after eating the breast, the juicy leg, and the delicate wing, he next proceeds to suck the bones, and afterwards grinds them all up in his powerful jaws.

We are next introduced to Old Jonathan of the Idovers, a genuine specimen of the small farmer of the olden time, who wore straight shoes, not rights and lefts, and regularly changed them every morning, that they might not become adapted to either foot in particular; grew upon his own farm the bean straw which composed the unwoven carpet of his best room; carried out daily exactly a quart of beans to his pigs, or supplied them from his capacious coat pocket with a meal of acorns gathered during his walks; and withal so wisely adjusted his business matters that "each one of his beans in his quart mug, each one of the acorns in his pocket, became a guinea."

Old Aaron the poacher, detested by Hilary and suspected by everybody, and young Aaron the powerful farm labourer, singing to his cows and falling asleep upon his milking-stool with the pail still between his knees, which he retains long after the cattle have wandered back to their pastures, getting into endless troubles, and all owing to an overweening fondness for the "brown jug," are characters true to life. So also is Uncle Bennett, another farmer upon the Downs, or rather in the Coombe Bottom, who is always too busily engaged upon nothing to be able to pay the expected family visits, and who when rallied by his niece Cissy upon this, and invited at once to jump into the pony cart and return home with her, stands in hopeless bewilderment at the bare thought of being able thus suddenly to make up his mind to pay a visit!

Cicely, the quiet, thoughtful little daughter of Hilary, is first introduced, sitting upon an ash log in the old kitchen, and looking out through the small yellow and green panes of the low window upon the busier scenes of the rickyard, or with her stool placed in the capacious chimney corner, looking up through the broad tunnel-like chimney, admiring the deep azure of the sky by day and the glittering of the stars by night, sometimes roaming along the hedgerows to admire their wild luxuriance, at other times listening to the gossip of the old women who discourse eloquently upon "yarbs" and their virtues. Later on we encounter her upon the verge of womanhood, busily engaged at the cheese-tubs, where "her rounded arm shone white and smooth with the gleam of a perfect skin," suggesting Poppæa bathing in milk; or turning the heavy cheeses with a sleight of hand which astonished the observer.

A few extracts of interest to our readers may be made from those pages of the work which treat of trees and woodland scenery generally, but these we must reserve for a future number.

*How to manage a Steam Engine.* By M. POWIS BALE. London: Wyman and Sons, Great Queen Street.

A VALUABLE little handbook for the engine-driver, and for all who are concerned in the purchase, the use, and the erection and repairs of steam engines. In a series of short chapters the author, in concise and yet comprehensive terms, treats of the construction of engines, the management of steam boilers, the explosion of boilers, driving belts, fuel, incrustation, corrosion, the setting of boilers, and other subjects of equal importance. The rules given for finding the horse-power of engines are founded upon data of a trustworthy character. In the chapter on fuel many valuable hints are given respecting the arrangement of fire-bars, the maintenance of the fire, the admission of air, and the composition of various kinds of coal. The book will be found especially useful to the colonist, and indeed to all persons using the steam engine in districts where skilled labour is not easily obtainable. The construction and uses of engines of all kinds are here treated of,—the horizontal, the portable, the vertical, the beam, and also the gas engine. Employers of steam power will do well to place the book in the hands of their engine-drivers, as from a careful perusal of its pages the most uninstructed may glean sufficient information to qualify him for his work, while at the same time the man of experience will meet with much that is well deserving of his attention. The work forms one of the volumes of Wyman's Technical Series.

*English Trees and Tree Planting.* By WILLIAM H. ABLETT, London: Smith, Elder and Co.

UPON taking up this book and glancing at its somewhat comprehensive "contents," we felt more hopeful than the perusal of recent works on tree planting would encourage us to have done, that we had at last met with a book that would repay careful reading. If "English Trees and Tree Planting" has done so, it is in a very different way from what we anticipated. Of sound practical tree planting, or tree culture, there is but little; of tree lore and anecdote there is abundance. Although the book totally fails as a practical manual, it will afford all lovers of our English trees much interesting reading, and by many will be highly appreciated from the gossipy, non-pedantic style in which it is written.

However, most professional men prefer to have their business and gossip served up separately; and when practical instructions are placed before them, they expect them to be clearly, concisely, and correctly formulated. A sentence which runs the length of a whole page—and in which the subject rambles "from China to Peru"—is not a matter easy of digestion, and particularly so when the statements made are involved or ambiguous.

Here is a piece of information for foresters and botanists. In treating of the effect of soil and situation upon trees, the author says "the Scotch pine is popularly represented as a tree that will grow almost anywhere, and so indeed it will, in nearly all situations for a time; but it very plainly manifests its preference for certain soils and situations. If planted in damp lands it soon ceases to increase in bulk, while if placed in warm southern exposures, the natural consistence which forms its resinous juices becomes deranged, and the oily secretions of its bark, which favour the growth and living economy of the tree, is exuded in the shape of vapour; and the compound of its parts becomes injured and weakened. Its natural *habitat* is in a sandy loam, with a dry shattery bottom, in a cool climate, in a northern exposure." The finest Scotch pine forest which we have seen growing in its "natural habitat" produced the largest number of fine trees, and the best quality of timber, in those parts with a *southern* exposure. And Scotch pine grown in its native forests, or in well-managed plantations, is never exposed to the evil effects predicted above from the direct rays of the sun. On the contrary, sunshine at the proper seasons is as beneficial to Scotch pine as it is allowed to be to every other timber tree; although undoubtedly the pine thrives better than many trees in a northern exposure, and in consequence when the soil is suitable, it is wisely selected for planting in such places. Again, referring to the cedar of Lebanon, it is said that "though commonly planted in England in sheltered situations, where indeed the quality of its timber becomes deteriorated, and its soft wood is commonly recognised in the form used for lead pencils"! Such a ridiculous error any schoolboy might have corrected. The "cedar" wood "used for lead pencils" is the produce of an American juniper (*Juniperus Bermudiana*), as the author himself correctly states in another portion of the work when treating of the Bermuda juniper. Then, to come to a more practical matter—the cultivation of the yew,—the author says, "The berries of the yew become ripe in autumn, when they should be collected and cleared from the pulp in which they are incased, by washing. The stones, or seeds, should then be commingled with three times their bulk of sand, and put into a pit for a year or fourteen months," a piece of "cultivation"—washing, and also putting in sand—which no practical man would ever waste time in performing, when the seeds are known to keep as well and germinate better without being washed. However, it is needless to multiply examples of bad practice or want of knowledge in cultural matters, as it is evident the book is not intended for those who have a practical knowledge of arboriculture, and to treat it from their point of view might be doing the work bare justice.

In matters of history the book is also rather deficient, although the author aims at being complete and interesting. Among others, the history of the yew is treated somewhat fully, and especially the famous old yew at Fortingall, in Perthshire, Scotland, the description of which is quoted from the *Edinburgh Philosophical Journal* for 1833! the author probably having quite overlooked the most recent and complete history of that remarkable tree, given to the public by Sir Robert Christison, Bart., only last year. Indeed, the book, generally speaking, gives one the idea that it must have been written half a century ago, by the way in which the knowledge and practice of the present day is treated, or rather ignored. With regard to the author's ideas about "Ornamental Planting," it is difficult to decide whether he is behind or before the taste and practice of the day; but the following idea savours of originality, if the taste is dubious:—"In the formation of ornamental plantations it is, of course, desirable to produce an immediate effect, and this can be obtained by trees that have been frequently transplanted into Nursery lines. . . . . When a perfect effect is sought for, in warm situations upon an open border, a great finish is obtained by making use of some of the plants of the natural family *Solaneæ*, to which the love-apple, or tomata, and the egg-plant belong. Though the young plants require to be forwarded in a hotbed, they may be made to produce fruit in warm and sheltered borders." Here follows a meagre account of the tomata and egg-plant, and nearly three pages of a dissertation on the "Dead Sea Apple," which we doubt not would put a "great finish" with "perfect effect" on any ornamental tree planting, or planter! Still, with all its faults, the substance for the making of an entertaining book of tree lore is in the work, if all attempts at practical instruction, which is too evidently borrowed or absurd, were totally eschewed.

*The Fern Paradise.* By FRANCIS GEORGE HEATH. Sixth Edition. Parts VIII. IX. & X. London: Sampson Low, Marston, Searle, and Rivington.

THIS neatly illustrated and charming work well maintains the excellence with which it began, and when complete it will form one of the most beautiful and interesting works on any branch of natural history which can adorn the drawing-room table or the lady's boudoir. The parts before us contain entertaining chapters on several interesting tribes of ferns, every species of which is minutely described, and tastefully illustrated with a neat etching of a frond. As an example of the attractive style of the work, the remarks upon the holly fern, in Part. IX., are worthy of extract:—"Differing in many essential points from the other species of *Polystichum* the holly fern (*Polystichum lonchitis*) has, nevertheless, a clearly defined relationship to *Aculeatum* and *angulare*. It is, indeed, a singular-locking, yet withal a beautiful fern; and its leaflets possess a sufficiently near resemblance to the leaves of a holly bush to warrant the name which it bears. Sometimes this fern grows to a height of only six inches or so. At other times it may be found exceedingly vigorous, growing as long as eighteen inches, and under such circumstances very stiff and erect in habit. It is a somewhat rare plant, but is found in certain localities in Scotland—some of the mountainous districts—and in Ireland, being in these countries more plentiful than in England and Wales. In England its distribution is confined to the northern counties. A tufted root-stock; a short scaly stem; a frond narrowly lance-shaped, consisting of two rows of wing-shaped serrated leaflets, diminishing in size by gradation towards the tip of the frond. Such is the holly fern. Its peculiarity is that it has no branches like the other two species of its kind, *aculeatum* and *angulare*; but one simple rachis, clothed on each side with a row of spiny leaflets. In fact, it has a sort of general resemblance to a single branch of *Polystichum aculeatum*. One peculiarity about the leaflets of this fern must be noticed. The upper portion of each one next the rachis projects a little over the leaflet immediately above it. The leaflets are attached to the rachis by a narrow point, but without the intervention of a stalk. The fronds of the holly fern are robust and evergreen in character—dark green in colour—rigid, and prickly-looking. They withstand the frost, and often remain until the new spring fronds are producod."

Part X. contains the completion of the chapter on the Woodsias, including the remainder of the description of the Oblong Woodsia, and the description of the Alpine Woodsia. A chapter is also devoted to the Buckler Ferns, the various species of which are fully described. Accompanying the part are two plates, which clearly illustrate the principal ferns mentioned.

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REMARKABLE YEW TREES.—A few months since you asked for information as to any remarkable yew trees in the country. There is a fine one in the churchyard of Stedham, in West Sussex. I found its girth, at about eighteen inches from the ground, to be 28½ feet; higher up the bole swelled out, but the ivy prevented the measurement from being taken. The tree is in full vigour although hollow, but it is to be feared that the ivy will soon injure it if not checked.—H. K., in "*Gardener's Chronicle.*"

## OUR FOREIGN EXCHANGES.

THERE have been received from Bohemia, *Haj*, No. 8; *Lovena*, No. 8; *Domacnost*, No. 8: from Austria, *Gartenlaube*, Nos. 24, 25, 26, 27, 28 and 29; *Handelsblatt für Walderzeugnisse*, Nos. 32, 33, 35, 36: from Spain, *Revista de Montes*, No. 85, 86, 87: from France, *Revue des Eaux et Forêts*, No. 8; and by myself, from Bavaria, reprints from *Centralblatt für das gesammte Forst-Wesen*, of papers in the issues for July, August, and September, by Forstrath, Dr. Nordlinger, Professor of Forest Science in the Royal Wurtemburg Academy of Land and Forest Economy at Hohenheim; and *Vägledning i Skogshushallning*, &c., *utarbetad* af C. G. Holmertz.

The last-mentioned work, "An Introduction to Forest Economy, designed for Forest Schools, Agricultural Institutions, and Forest Officials and Inspectors," compiled by Professor C. G. Holmertz, Director of the Royal *Skogs Institutet*, or School of Forestry in Stockholm, may be taken as a fair illustration of the kind of instruction required and given in such institutions in forest lands on the continent of Europe.

Part I. supplies appropriate instruction in regard to forest management, and to clearing and planting; in regard to the culture to be given to the different kinds of trees found in the forests of Sweden, and the properties of timber of different kinds of these; in regard to forest nurseries, forest thinnings, the replanting of bare spots, and natural reproduction of forests by self-sown seed of different kinds of trees; with a comparison of the relative advantages of natural reproduction and artificial planting or sowing. Information is then supplied in regard to what is desirable in the collection and management of forest seed, and the testing of its quality; the conditions of germination and development; the period for sowing; the modes of doing this, the covering of the seed with mould, and the implements made use of; in regard to the management of young trees in nurseries; the transplanting, and planting out, and forms of young trees; the subsequent management of these in forests; and in regard to the value of different forest products.

Part II. relates to forest technology, detailing the technical or economic properties of timber, and the applications made of forest products as timber, firewood, charcoal, tar, &c.; information in regard to the treatment of timber after it has been felled; to implements used; to the cutting up and preparation of timber for sale or use; to the transport of forest products by land, and the construction of forest roads, and the transport of timber by water in logs and in rafts.

Part III. treats of what is known on the Continent as forest taxation, embracing forest surveying, estimates of contents, of growth, and of value, the preparation of forest charts, and tabulated inventories.

Dr. Nordlinger's papers treat of the density of wood cut at different periods of the year, and of the specific gravity of different kinds of wood when green and when dry; the actual quantity of moisture, and the relative percentage of this in the wood,—the whole being illustrated by tabulated statements, and diagrams:

In the *Handelsblatt* appears what may be new to many—the Forest Law of Turkey; and a report by Dr. Gustav Marchet of the timber produce of the State forests of Austria.

In the *Revista* are reported the questions proposed for discussion at an international congress to be held at Saragossa, in the month of October, for the consideration of means employed for the arrest of the diffusion of the the phylloxera, and its extirpation and destruction; and an account of the Italian School of Forestry at Vallambrosa, by Don Rafael Alvarez Sereix.

In the *Journal of Forestry* for October last year appeared the first part of a translation of a paper in the *Revue des Eaux et Forêts*, by M. Joubaine, on the forest reforms carried out under Colbert, the continuation of which appeared in the number for March last. In the *Revue*, No. 9, appears a further continuation of the same by another writer, supplying a copy of the report furnished by Colbert; and the abuses discovered in the Province of Louraine, a translation of which is forthcoming when space for it may be found.

In the same number appears a second paper on light, shade and humus in forest culture, and a continuation of the forest budget of Algeria.

JOHN C. BROWN.

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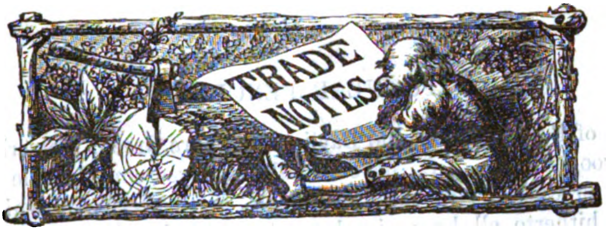
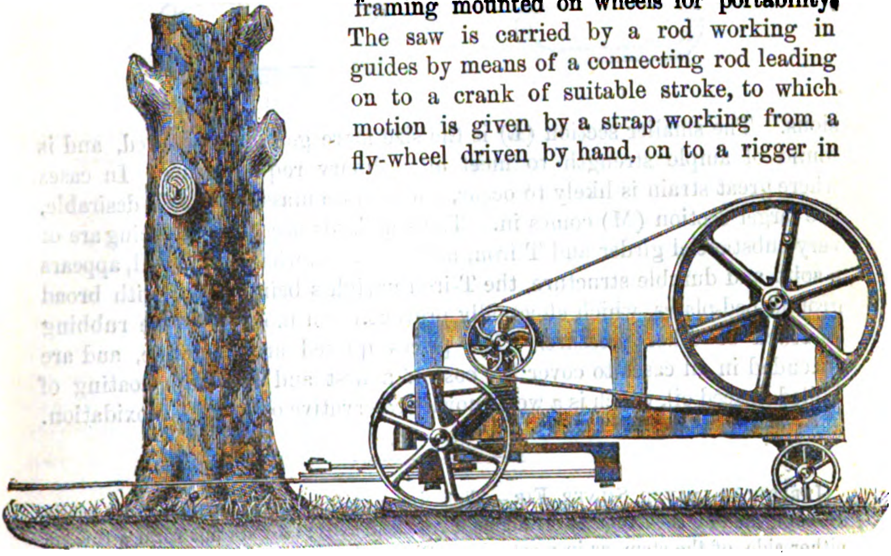
THE MAMMOTH TREES OF AUSTRALIA (*Eucalyptus diversicolor*).—One of the grandest trees of the globe, and one of the greatest wonders in the whole creation of plants. Astounding records of the height of the giant tree have been given. Messrs. Muir saw trees with stems about 300 feet high up to the first branch, and I myself noticed many trees which approached to 400 feet in their total height. When closely growing the young trees may have a comparatively slender trunk, so much so that a tree 180 feet high may show a stem hardly above a foot in diameter; in such a case the foliage, for want of space, is also only scantily developed, and the ramifications are but short in proportion to the tallness of the stems. In the mast-like straightness of the trunk and the smooth whiteness of its bark, this superb tree imitates completely the variety *regnans* of *E. amygdalina* of South-east Australia, with which also, and perhaps solely, it enters into rivalry as the tallest tree of the globe! Even the loftiest trees may not yet have been found out in the secluded humid forest valleys, in which *E. diversicolor*, like *E. amygdalina*, rejoices most and luxuriates to the greatest extent. But possibly in the 200 miles of uninterrupted length of Sequoia forests, a few years ago made known to exist in Southern California, mammoth trees of either *Sequoia Wellingtonia* or *S. sempervirens* may occur, which possibly excel in stupendous height even the famous individual trees of the Calaveras grove.—"*Eucalyptographia*," *by Baron Ferd. von Mueller.*



## A TREE-FELLER.

**This simple machine, manufactured by Messrs. S. Worssam and Co., of Chelsea, London, is intended for the purpose of felling trees, or cross-cutting them after they have been felled. It consists of a light cast-iron framing mounted on wheels for portability.** The saw is carried by a rod working in guides by means of a connecting rod leading on to a crank of suitable stroke, to which motion is given by a strap working from a fly-wheel driven by hand, on to a rigger in connection with bevel-gearing and the crank-shaft. A feed-motion is given to the saw by means of a weight at the end of a rope, which passes round a drum encircling the crank-shaft.



Worssam and Co.'s Tree-feller.

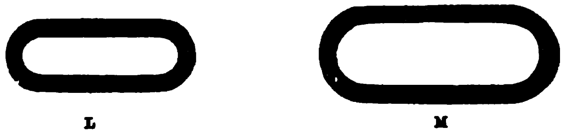
Two men suffice to work this machine, and on account of the lightness of its construction, it can easily be moved about in the forest.

If necessary it can be driven by steam-power by an ordinary portable engine, in which case the fly-wheel shaft, shown in the illustration, must be fitted with fast and loose pulleys.

If the machine is to be used for cross-cutting the trees as well as felling them, a slightly different arrangement is adopted from that shown.

## TUBULAR FENCING.

THE firm of Bayliss, Jones, and Bayliss, Monmore Green, Wolverhampton, and 3, Crooked Lane, E.C., have already achieved considerable notoriety for their productions in tubular fencing, the patterns of which have, however, hitherto all been circular. As a result of careful study and experiment the firm now bring before the public a further improvement, which consists in making the horizontals of flat-sided, close-jointed tubes, instead of round, which greatly increases the strength of the fence, and enables it to be readily bent round curves, whether obtuse or acute. In this particular shape it has been found necessary to adopt two distinct sizes only, both which we illustrate below in section and in literal dimensions. The smaller section (L) is the size more generally adopted, and is found of ample strength to meet all ordinary requirements. In cases where great strain is likely to occur, and a more massive fence is desirable, the larger section (M) comes in. The standards used in the fencing are of very substantial girder and T iron, and the work, when completed, appears a solid and durable structure, the T-iron uprights being fitted with broad ground bed-plates, which effectually prevent them moving by the rubbing of stock or other pressure. The prices quoted are moderate, and are intended in all cases to cover the cost of a first and thorough coating of boiled linseed oil, which is a well-known preservative of iron from oxidation.



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**IRREGULAR-LEAVED SILVER FIR.**—This fine conifer (*Picea concolor*) is easily distinguished by the irregular arrangement of the leaves; they do not form a row on either side of the stem, as in most of the Piceas, but grow from the top and even the bottom of the branches; they are about 2 in. long, of a whitish hue, changing to pale green as they grow old, the upper and lower surfaces being of the same colour. The cones are borne in an upright manner singly on the branches, and are from 3 in. to 4 in. long. As a tree its colour is very pleasing, and it deserves to be more extensively planted than it is, being very symmetrical and free as regards growth. It should be planted in elevated positions in preference to low-lying lands, for although it grows very freely in the latter it is somewhat liable to be cut by spring frosts. *P. Lowiana* and *Parsonsana* are often confounded with *P. concolor*, but they differ in the leaves being somewhat longer and arranged in a regular row on each side of the stem; they then curve gracefully upward, and form, as it were, an inverted arch. *P. concolor* is freely distributed throughout California, where it attains the dimensions of a large-sized tree.—ALPHA, *in the "Garden."*

# TRADE LISTS.

SINCE our last notice we have received the following catalogues and trade lists:—**JOHN WARNER & SONS**, Bagshot, Surrey; "Catalogue of Rhododendrons, &c.," containing an excellent descriptive list of the choicest hardy rhododendrons, for which the Bagshot nurseries are so famous; and also full lists of the best conifers, American plants of all the choicest kinds, hardy heaths, standard trees for avenues, parks, streets, &c., forest trees, and hardy ornamental trees and shrubs of all descriptions likely to be in demand upon the most extensive estate.—**WILLIAM BARROW & SON**, Elvaston Nurseries, Borrowash, near Derby; "Catalogue of Forest Trees, &c.," in which some useful practical hints on the treatment of trees after removal are promised to their patrons, so as to ensure success in transplanting valuable specimens. A good illustration is given of the transplanting machines invented and used by the firm for about fifty years back, accompanied by some testimonials as to their complete success. Messrs. Barrow & Son say that "by the use of these machines an effect can be produced at once which could not be otherwise accomplished in one or two generations; so that a place is soon made enjoyable to its possessor, and trees of great beauty and value can be removed to more suitable sites, or prevented from being spoiled when planted too near others."—**JOSEPH ROBSON & SON**, the Nurseries, Hexham, Northumberland; "Catalogue of Forest and Ornamental Trees, &c.," gives a good list of novelties and specialities among hardy trees and shrubs, and a well got-up priced list of all the ordinary stock of a provincial nursery, and which are always in demand in the surrounding country.—**WALTER CARSON & SONS**, London and Dublin; "Carson's Original Anti-Corrosion Paint." No better paint can be used than this for all outdoor work, as has been proved by its extensive use for a long series of years; but purchasers should be careful to procure the genuine "original" article, as manufactured by this firm, if they desire to obtain the best results. All interested in the durability of outdoor painting, should read Messrs. Carson's pamphlet.—**HILL & SMITH**, Brierley Hill Iron-works, Staffordshire; also of London, Glasgow, and Dublin; "Illustrated Catalogue of Patent Continuous Iron Fencing, &c." This comprehensive catalogue should be in the hands of every fencer, forester, and estate manager, as well as every farmer throughout her Majesty's dominions, as it contains a list of every useful invention connected with iron and wire fencing, and the best mode of applying them. From the numerous illustrations and the comprehensive list of prices, the most fastidious and economical person cannot fail to make a selection that ought to satisfy every ordinary requirement.—**G. B. SMITH & Co.**, 61 and 67, West Regent Street, Glasgow; "Illustrated and Descriptive Catalogue of Premium Continuous Wrought Iron Fencing, Entrance, Park, and Field Gates, &c." In this catalogue, which appears at an opportune time, will be found great choice in the way of fencing adapted to all kinds of wants and circumstances, and also several useful specialities in the construction of iron bar and wire fences. Lists and prices are also given of many articles in iron and wire for use in the garden and stable, as well as on the farm and the estate.—**ROBERT PEDDIE & Co.**, Tynecastle Iron-works, Edinburgh; "Illustrated Catalogue" of the usual descriptions of iron and wire fencing, carriage, entrance, park and field gates, wickets and stiles, galvanized corrugated iron roofing, hot water heating apparatus, stable and cowhouse fittings, wire netting and wire work, iron bridges, and a number of other handy articles in daily use.—JOHN WARNER & SONS, Cripplegate, London; a list of garden engines, pumps, hydraulic rams, fire engines, water-barrows and carts, fountains, and other articles connected with the supply, conveyance, and distribution of water from the smallest to the very largest scale, and for which this firm has obtained a widespread celebrity.

The following catalogues have also reached us:—OSBORN & SONS, The Fulham Nurseries, London, S.W., "General Catalogue of Stone and Greenhouse Plants, Ferns, &c."; "Catalogue of Alpine and Herbaceous Plants and Hardy Ferns;" and "Catalogue of Hyacinths, Tulips, and other choice Flower Roots."—JAMES VEITCH & SONS, Royal Exotic Nursery, Chelsea, S.W., "Catalogue of Hyacinths and other Bulbous Roots."—B. S. WILLIAMS, Victoria and Paradise Nurseries, Upper Holloway, London, N., "Catalogue of New Plants," and "General Bulb Catalogue."—WILLIAM PAUL & SON, Paul's Nurseries, Waltham Cross, Herts, "Catalogue of New Roses, Geraniums, Phloxes, &c.," and "Bulb Catalogue."—LITTLE & BALLANTYNE, Carlisle, "List of New Roses, Stove and Greenhouse Plants, &c.," and "Bulb List."—A. M. C. JONGKINDT CONINCK, Tottenham Nurseries, Dedemsvaart, near Zwolle, Netherlands, "Wholesale List of Hardy Perennials and Rock Plants."—CRANSTON & Co., King's Acre Nurseries, Hereford, "Descriptive Catalogue of New Roses, &c."—JOHN LAING & Co., Forest Hill, London, S.E., "Catalogue of Stove and Greenhouse Plants."—DICKSONS & Co., 1, Waterloo Place, Edinburgh, "Descriptive Catalogue of Florists' Flowers, &c.," and "Illustrated Catalogue of Select Dutch Flower Roots, Bedding Violas, &c." THOMAS METHVEN & SONS, 15, Princes Street, Edinburgh, "Descriptive Catalogue of Dutch and other Flower Roots."—SUTTON & SONS, Reading, "Bulb Catalogue." JAMES DICKSON & SONS, 108, Eastgate Street, Chester, "Bedding and Border Plants," and "Bulbous Flower Roots, &c."—JOSEPH ROBSON & SON, Bank Foot, Hexham, "Descriptive List of Herbaceous, Alpine, and Tuberous Rooted Plants," and "Price List of Dutch Flower Roots."—JAMES ANDERSON, Meadowbank, Uddington, Glasgow, "Special Catalogue of Orchids, Stove and Greenhouse Plants, and Greenhouse Bulbs."—THE NEW PLANT COMPANY, Lion Walk, Colchester, "A Retail List of Orchids, Bulbs, &c."—CARTER & Co., High Holborn, London, W.C., "A Catalogue of New, Rare, and Choice Plants."—FRANCIS AND ARTHUR DICKSON & SONS, Upton Nurseries, Chester, "Catalogue of Bedding Plants, New Roses, &c."—A. ROOZEN & SON, Oberveen, near Haarlem, Holland, "Catalogue of Hyacinths, Tulips, &c."—DOWNIE & LAIRD, 17, Frederick Street, Edinburgh, "Descriptive Catalogue of Dutch Flower Roots."—R. J. MACKINTOSH, 12, Melbourne Place, Edinburgh, "Catalogue of Select Dutch and Cape Flowering Bulbs."—GEBROEDERS ROOZEN, Oberveen, near Haarlem, Holland, "Special List of Select Hyacinths, Tulips, &c."—JAMES DICKSON & SONS, 32, Hanover Street, Edinburgh, "Select List of Dutch Flower Roots."—IRELAND & THOMSON, 20, Waterloo Place, Edinburgh, "Catalogue of Dutch and French Flowering Bulbs."—THE LAWSON SEED AND NURSERY COMPANY, Edinburgh, "Dutch Flower Roots, &c."—KENT & BRYDEN, Darlington, "Catalogue of Flowering Bulbs."—JOHN SHAW & Co., 29, Oxford Street, Manchester, "List of Hyacinths, Tulips, &c."—WILLIAM BULL, King's Road, Chelsea, "Retail List of New, Beautiful, and Rare Plants;" also "List of Select Flower and Vegetable Seeds, &c."—And EWING & Co., Royal Norfolk Nurseries, Newmarket Road, Eaton, near Norwich, "List of Clematis, 1880."

**Relative to planting shrubs and trees near the sea,** Mr. B. Cowan writes to the *Journal of Horticulture* as follows:—"I should feel glad if any of the readers of the Journal who have lived near the sea would give me their advice as to what trees or shrubs endure the saline air, and are also not affected by the manufacture of chemicals, such as alkalies, muriatic acid gases, &c. When the wind is in the east we get the breezes direct from the sea, and when in the west the air is quite thick, and at times strongly impregnated with the smell of alkalies. I am extremely anxious to plant, but am at a loss to know what is best to do. Nothing seems to stand but elders; I therefore feel inclined to plant belts of them for shelter. Can it be explained why elders withstand the effect of chemicals? Is it through any peculiar chemical constituent they contain?

**Some French Trees.**—At the Château of Vrigny there is a cedar of Lebanon, 55 metres (180 feet) in length, and 2 metres 60 (nearly 9 feet) in diameter. It is without contradiction the finest tree of its kind known in France, and its seed alone brings annually to its owner 2,000 francs, say £80. It was planted by Dechamel, a name dear to horticulture, and is brother to that in the Museum of Natural History, sent by Sherard to Bernard de Jussieu in 1736. There is also to be seen in the same place a *Quercus rubra* (scarlet oak) 20 metres (62 feet) high, and 1 metre (39 inches) in diameter, which species of tree deserves to be more propagated than it is. Close by, in the park of Monceau, there is a Western plane tree, probably the most ancient one known in France, and of a prodigious height, which was also planted by Dechamel.

**Indian Forestry.**—A forest conference was held on Saturday, 31st July, at Poona, in the Council Hall. There were present the Governor of Bombay in Council, the Revenue Commissioners, and Mr. A. F. Shuttleworth, of the Forest Department. No definite policy was decided upon. Sir James Fergusson is said to be well versed in forest matters.

**Tree Planting in South Africa.**—The Commissioner of Crown Lands and Public Works in Cape Colony has given notice that, in order to encourage tree planting in the colony, the Government is prepared to sell from the plantations at Rondebosch, the seeds or young plants of various forest trees, at very reasonable rates. Young gum trees can be had at the rate of ten for a shilling, and hakia trees at 30s. per 1,000; while the seeds of casurina, stone pine, cypress, and other trees can be had at rates varying from 2s. per dozen to 7s. 6d. per bushel.

**Injurious Effects of the Plane Tree.** — A French medical journal has recently called attention to the injurious effects that are apt to follow a residence near the common shade tree, the button-ball or plane tree. The fact has long been known, even from the time of Pliny, that a stay near these trees is often followed by an irritation of the air-passages, followed by a disagreeable and sometimes persistent cough. This is due to the fact (familiar to botanists, though perhaps not to the general public) that the young shoots, leaves, and stipules are covered with a fine thick down, composed of minute branched rigid hairs, which falls off as these parts become older, and often floats in the air in large quantities. It is the inhalation of this that causes the throat difficulties. It often causes serious annoyance to *employès* in nurseries where the tree is raised, and who fail to take precaution against it.

RINGS IN TREES.—A ring does not always denote a year, for the blue gum tree of Australia sheds its bark twice a year. A tree recently hewn, that was known to be only eighteen years old, showed thirty-six distinct rings of growth.

THE LARGEST TREE IN THE WORLD.—Our Yankee brethren have long been noted for "tall talk" and "big things," and they now lay claim to exhibiting in New York a section of the largest tree in the world, brought from California, referring to which the *New York Herald* says:—"This wonderful specimen of nature's handiwork was discovered in 1874. It was growing in a grove near Tule River, Tulare county, California, about seventy-five miles from Visalia. Its top has been broken off, probably at some remote period, and when discovered it was still 240 ft. high. The body of the tree where it was broken was 12 ft. in diameter, and had two limbs measuring respectively 9 ft. and 10 ft. in diameter. The trunk measured below 111 ft. The ancient monarch of the forest is called 'Old Moses,' after a mountain near which it stood. It is supposed to be 4,840 years old, and it is the largest tree that has ever been discovered. The section on exhibition is 75 ft. in circumference, and 25 ft. across. It is capable of holding 150 people in its interior. The interior, as it is now fitted up, is arranged like a drawing-room. A carpet has been laid down; there is a piano, sofa, tables, and chairs, with scenes from California hung around, and people move about quite freely."—*Land and Water.*

THE COCOA-NUT PALM.—What the reindeer is to the Laplander, writes Dr. Bennett, of Sydney, the cocoa-nut palm (*Cocos nucifera*) appears to be to the Cingalese. The tropical beauty of its plumes will always captivate the thoughts of those who have been bred in northern climes; but apart from its graceful appearance, it has none but downright sterling useful qualities. As an article of food or furniture it is unequalled; from it cocoa-nut rope, mats, clothes, utensils, soap, oil, vinegar, treacle, sugar, and arrack are made—everything, in fact, being accounted for excepting the milk, which, however, in a raw state, furnishes a refreshing drink, as the nut itself affords a form of food relished by man, and especially useful as a feeding-stuff for cattle, &c.

SYRINGA JOSIKÆ.—This old-fashioned lilac is by some admired quite as much as the commoner kinds, perhaps because it differs so much from them in appearance. Though the flowers are not so showy, they are, however, produced at a later period, as only a few days ago we saw some fine bushes of it in flower at Mr. J. Waterer's nursery at Bagshot. It is largely used on the Continent as stocks on which to graft some of the choicer kinds of lilac, such as Charles X., on account of its being more robust and less straggling in habit of growth. Another distinct species we were much struck with when in flower, and that was the Himalayan lilac (*S. emodi*). Although its habit of growth is somewhat coarse, it is different from any other kind with which we are acquainted, and the flowers are by no means unattractive.—*Garden.*

PETRIFIED TREES.—On the slopes of Amethyst Mountain, Wyoming, from 2,000 to 3,000 ft. above the river valley, in the Yellowstone Park, are exposed at different levels, at intervals through the entire height, a series of silicified trees, many rooted in the position in which they grew, and from 20 to 30 ft. in height.

OSMANTHUS ILICIFOLIUS.—This is much hardier than is generally supposed, for in the Bagshot nurseries we lately saw some fine pyramidal specimens of it looking healthy and vigorous, and quite uninjured by the severity of the last two winters. Certainly the position they are in is low and sheltered and the soil light, circumstances which greatly assist in enabling this plant to withstand the cold. The ornamental appearance of its holly-like evergreen foliage, and the powerfully delicious perfume of the clusters of tiny white flowers, make it a desirable shrub for planting anywhere, more particularly in the more favoured localities.—*Garden.*

**Remarkable Trees.**—In your correspondent's note on Ribston Hall is mentioned a large plane, having a circumference of 16 ft. This is undoubtedly a grand tree, and I imagine there are but few in the country larger. But this estate—Fawley Court, Bucks—is remarkable for fine planes, several of them being over 80 ft. high, and one, standing a short distance from the kitchen-garden, has a circumference of 18 ft. 8 in. at three feet from ground line. Also in the churchyard of Fawley is standing a fine old yew, measuring at three feet from the ground 17 ft. 7 in.; this contains within its hollow trunk two other good-sized yew trees; these, at some twelve or fourteen feet from the ground, have clutched the old giant in their arms, and will probably hold him fast for generations to come. I have noticed that where old yews are to be found in churchyards, they are in almost every instance solitary.—F. C., *in "Gardener's Chronicle."*

**Peculiar Property of Elm.**—In a work on trees, by Dr. Westmacott, of Newcastle-under-Lyne, published in 1694, we find the following curious remarks:—"The planks or groaning boards exposed as a kind of prodigy some time ago to the view and hearing of many people, were of elm; the air-vessels of this wood being more large than in other timber, upon the application of the red-hot iron, as was usual, the air and watery parts in the timber were rarefied, and every vessel became, as it were, a little windpipe for their expiration; and so many pipes playing together made a kind of big or groaning noise."

**Wood on Fire in Morayshire.**—A portion of the Altyre Woods, belonging to Sir William G. Gordon-Cumming, Bart., was discovered to be on fire about three o'clock on the afternoon of the 31st of August. The woods are situated about three miles from Forres, near the line of the Highland Railway. Intelligence was at once conveyed to Forres, when an engine was despatched with a gang of surface-men who were fortunately at hand. On arriving at the fire it was found that a large extent of valuable plantation had been overrun by the flames. The efforts of the men were latterly successful in subduing the flames, after raging for nearly three hours. The total extent of the forest destroyed is computed to be about thirty acres, and the fire is supposed to have been caused by a spark from a passing engine. The brushwood was still smouldering at a late hour the same night, but all danger of further damage was past.

**Appointment of Mr. Adam as Governor of Madras.**—We are informed that her Majesty has been graciously pleased to approve the appointment of the Right Hon. W. P. Adam, M.P., First Commissioner of Her Majesty's Works, to succeed his Grace the Duke of Buckingham as Governor of Madras. As at present arranged the Duke of Buckingham will not terminate his official duties in India until November 23rd. Mr. Adam has not yet arranged the period of his departure from England, but it is stated that he will not leave until the end of October or the beginning of November. Mr. Adam, as most of our readers are aware, is a distinguished arboriculturist, and ex-President of the Scottish Arboricultural Society.

**Tree Felling in China.**—In China a law has been enacted that if a son or grandson fell, on any pretext whatever, from one to five trees growing around the tomb of his father or grandfather, he shall receive a flogging of 100 blows, and shall wear a heavy cangue or wooden collar for a period of one month. If he fell from five to ten trees he shall receive a flogging of 100 blows, and shall wear a cangue for two months. If he fell from eleven to fifteen trees he shall receive a flogging of 100 blows, and shall be transported to a neighbouring province for three years. If he fells trees exceeding fifteen in number he shall be transported for life. It is further enacted that if a person fell trees growing around any of the tombs in the public cemeteries, he shall receive a flogging of 100 blows and shall wear a cangue for one month. If convicted a second time he shall receive a flogging of 100 blows and shall wear a cangue for three months, and if convicted a third time he shall be transported.

Venerable Yew Trees.—To those interested in such matters I may say that there is (or was a few years back) a magnificent yew in the churchyard of Darley Dale, Derbyshire. It was said to be "nearly a thousand years old," and had lost several limbs in its long life, but was a most picturesque subject for the pencil. About three miles from Brecon, South Wales, there is a grand group of yew trees in their prime, thirteen or fourteen in number. The correct spelling and pronunciation of the name of this village would be hopeless to any Saxon, male or female; but it is close to the beautiful river Usk, and will repay a visit to those who want a ramble on a long summer day.—H. M. E., *in "Gardener's Chronicle."*

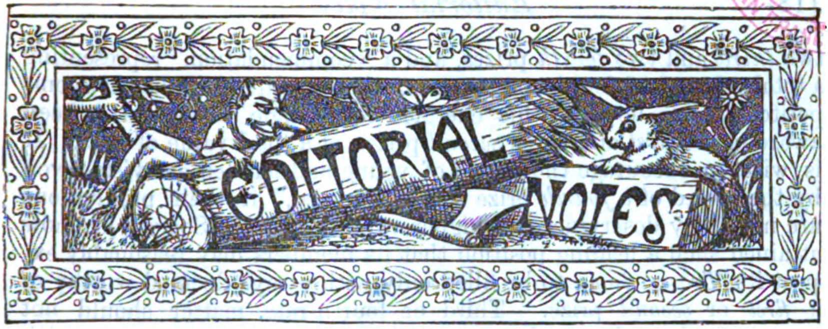
Does Frost kill Grubs?—This would appear to meet with a decided negative, from the fact that the larvæ of the crane-fly (daddy-longlegs), so prevalent this year, were exposed lately by that eminently practical entomologist, Miss Ormerod, to 10 degs. Fahr., or 42 degs. of frost, without any appreciable effect on their vitality.—*Farmer's Gazette.*

Last Winter in Belgium.—The *Bulletin d'Arboriculture* records the following losses among conifers:—*Araucaria imbricata* completely destroyed; *Cedrus Atlantica, Deodara Libani*, all the young plants in nurseries destroyed; *Cryptomeria elegans*, killed; *Podocarpus*, all species killed; *Prumnopitys elegans*, killled; *Taxus Hibernica*, killed in most places; *Taxodium sempervirens*, killed to the ground; *Thuya gigantea*, injured; *Wellingtonia*, greatly injured; *Retinospora obtusa*, killed; *R. pisifera*, unhurt. The following have been hurt but will recover:—*Abies lasiocarpa, nobilis, Douglasii, Nordmanniana, pinsapo; Biota orientalis aurea, Cryptomeria Japonica, Cupressus Lawsoniana, Juniperus sinensis, Cephaloraxus, Chamæcypris decussata, Taxodium distichum*, and *Taxus buccata.*

Cunninghamia Lanceolata.—One of the largest specimens we have met with of this handsome conifer, which is perhaps also as fine as any in the country, is in the beautiful pleasure-grounds at Bagshot Park, the Duke of Connaught's residence. At a rough calculation we should say it is very nearly 40 ft. high, and somewhat resembles the Brazilian Araucaria. Being evergreen it is highly ornamental, though it is somewhat tender, and our severe winters, especially the last two, have injured the foliage; but each year it recovers, and at present the branches are clothed with bright green young growth. The lower branches are horizontal and almost touch the ground, and render it, from this character alone, very distinct.—*Garden.*

Tree struck by Lightning at Abberton Hall, Worcestershire.—The *Worcestershire Chronicle* states that on the afternoon of Thursday, June 17, during the prevalence of a heavy storm, the lightning struck the top of a large elm a little to the east of Abberton Hall, the residence of Wm. Laslett, Esq., stripping it of bark from top to bottom, and carrying away a piece of hard wood, torn from the tree, and over 5 feet long, to the distance of sixty yards, many other pieces being carried to a shorter distance. A man standing under a neighbouring tree was almost blinded by the intensity of the blaze of light attending the electric flash.

Yours sincerely
Wm McCorquodale



THE Annual General Meeting of the Scottish Arboricultural Society and the Excursion connected therewith, have again passed off in a manner reflecting much credit on the forethought and management of the office-bearers, and the indefatigable industry of the members. A full report of the two days' proceedings is given in another part of our present issue, to which our readers can refer for details. Here we need only congratulate the Society on its continued prosperity, and the large number of landowners, and others interested in arboriculture, who have joined its ranks during the past year. These indicate better than aught else the growing importance of forestry in this country, and the strong feeling that is taking possession of the public mind that the art and science of forestry must soon form a much more important factor than it has hitherto done in the rural economy of the country.

The able and instructive address delivered at the opening of the meeting by the chairman, Robert Hutchison, Esq., of Carlowrie, affords much food for reflection and study, by all interested in the prosperity of the Society and the advancement of arboricultural science. To young foresters in particular it conveys much sound advice and suggestions of great importance, which merit their careful study and closest investigation. The report drawn up by Mr. Turnbull Smith, C.A., on the financial condition of the Society, shows that its finances are in a prosperous condition, and that the funds at the disposal of the Council are carefully managed, and dispensed with a judicious consideration for the best interests of the Society. A word of high praise is due to the Treasurer, Mr. John McLaren, jun., for the clear and business-like manner in which his first financial statement was laid before the meeting, and which augurs well for the prosperity of the Society's funds under his care.

The judges' report, read by the convener, Dr. Cleghorn, of Stravithie, contains some remarks of an instructive nature to the writers of competitive essays. Five essays sent in by one competitor called forth the remark from the judges that "these were short and imperfect," and the *strong recommendation* that essay writers should "concentrate their efforts on one or two subjects." Looking over the awards of the judges, the necessity for such a sensible recommendation is perfectly evident. The prolific essayist in the present year's competition, who furnishes exactly *half* the number of essays, receives two *third* and two *fourth* prizes, and a "commendation," representing a total value of £5, for his numerous effusions; while the other five competitors, each devoting his energies to a single essay, have been awarded two *first* and three *second* prizes, of a total value of £19. It is wise to encourage the efforts of young and maiden essayists, even by the award of a *fourth* prize "bronze medal," if their productions are not fairly deserving of a higher award; but the Society has now attained such a leading position that its members may reasonably expect its *Transactions* to be filled only with essays deemed worthy of a *first* or *second* prize. Third or fourth-rate matter should not be sent forth to the public under the imprimatur of a Society which numbers in its ranks the most distinguished and ablest arboriculturists of the day. We hope that both the essayists and the managers of the Society will do their best in the future to carry out the wise suggestions and recommendations so judiciously placed before them.

The scheme for obtaining a Royal Charter (the want of which is felt to be a considerable drawback to the usefulness of the Society) does not appear to have made much progress during the past year, but we hope the Council will not relax their efforts in this direction until they have obtained that very desirable privilege. The efforts of the Committee on Education, we are glad to observe, have been productive of good fruit, and their report will be read with deep interest by every one who aims at self-improvement, and has the manly ambition to aspire to raise himself and his fellow-labourers in the social scale. The initiatory scheme recommended by the Committee is sufficiently comprehensive for a beginning; but they must not rest in their labours until they have fully digested a thorough and comprehensive curriculum of forest education, and sketched out the best system for imparting it, in this country, to our young foresters, so as to thoroughly educate and train them for filling the highest offices in the forest service.

The discussions on the "Deterioration of Larch and Spruce," and the "Aphis on the Beech," as we anticipated, have elicited much information of an interesting nature. The various opinions and suggestions are well stated, most of the speakers being men of great experience, and all of them stating their facts and opinions in an unassuming but clear and intelligent style. These discussions on carefully-selected subjects are a feature in the meetings of the Society from which great benefit may be derived by the members, and which should receive the best encouragement of the Council.

The members of the Society were occupied early in the forenoon with the inspection of the working of a two-horse Hedge-Cutting Machine, invented by Messrs. Hornsby and Sons, of Grantham, on the farm of East Pilton, occupied by Mr. Inglis, and which created a considerable amount of interest among the members, it being the first exhibition of the kind held under the auspices of the Society.

An excellent day's work was appropriately wound up by the Annual Dinner, at which, as will be seen in our report, the well-deserved *Testimonial* was presented in an able and glowing speech by the Chairman, to Scotland's representative forester, Mr. William

M'Corquodale, of Scone, whose portrait we have much pleasure in presenting to our readers with the present number of the *Journal.*

The second day was devoted to the Excursion to the Earl of Hopetoun's magnificent policies and plantations at Hopetoun, Linlithgowshire, for which the members turned out in larger numbers than usual, and under the able leadership of Mr. McLaren, forester, they enjoyed a very pleasant and instructive ramble, amidst grand trees and the loveliest of Scottish scenery. The whole of the two days' proceedings were so well arranged that they were carried out without the slightest hitch, and reflected great credit on the Secretary, Mr. John McLaren, jun., who was untiring in his efforts to meet the wishes of every one, and to make the meeting, what it proved to be, a great success.

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We have received just before going to press a copy of the Agricultural Returns of Great Britain, which always contain numerous facts and figures of the greatest interest to every one connected with agriculture. This year, however, the Blue-book has a special interest for arboriculturists, as it contains a special return of the acreage of woods and plantations, no return of this nature having been made for the last eight years. We find that since 1872 the acreage under woods and forests in Great Britain has increased from 2,187,000 acres to 2,409,000 acres—an increase of nearly ten per cent.

The late moment at which these returns have come to hand prevents us this month from noticing them further than to record the above facts, but next month we shall be able to extract from them much useful information as to the distribution of woodlands in various parts of the country, and on other subjects.

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The capricious nature of the seasons for some years back received another forcible illustration during the past month in a snow-storm of almost unprecedented severity at such an early period. Snow began falling in London at an early hour on the 20th of October, and before noon it lay to a depth of two to three inches in open places in the suburbs. Over most of the middle and south of England snow fell steadily till near midday, and the air being still and calm it accumulated on every leaf, bough, and twig, until the trees were so heavily laden that the boughs yielded with a crash to the superincumbent mass, and many fine trees have been completely wrecked in consequence. Few trees had yet begun to shed their leaves, and thus presented a large surface for the snow to lodge upon. Conifers and other evergreens have been badly mutilated; but it is among broad-leaved deciduous trees that the greatest devastation has been wreaked. Oaks and elms were still in full leaf, and the enormous weight of snow bore down their massive arms and snapped them off, or tore them from their sockets with the power of giants. The destruction wrought among trees and shrubs in many places is hardly conceivable, and it will take years to obliterate the direful effects of the few hours' snowfall coming at such an unseasonably early period of the year.

The effects of the storm appear to have been especially severe in the county of Surrey, and several letters have appeared in *The Times*

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giving particulars of the damage done. Mr. Granville Leveson Gower, writing from Godstone, states that the destruction to trees in that part of the country was greater than any living inhabitant could recollect, and the cracking and falling of large limbs and branches were like the ceaseless reports of a rifle. The oaks, being in full leaf and heavily cropped with acorns, suffered the most; next to them came the elms, some of which were stripped from top to stem; the beech also suffered, but in a less degree; while the lime, chestnut, and sycamore, although bent to the ground, almost entirely escaped. The snow in the valley (altitude about 500 ft.) was about 4 in. in depth; on the hill (altitude 800 to 850 ft.), from 6 in. to 8 in. Another correspondent from the same district bore testimony to the remarkable effect produced on oak trees, which, still heavily weighted with acorns, had all the morning been groaning ominously beneath the additional burden of a dense sheet of snow, not one particle of which could escape to the ground through their full and hitherto scarcely discoloured foliage. At intervals a sharp crack marked the giving way of some sturdy branch, in many cases 20 ft. long. One vigorous tree between 30 and 40 ft. high was a complete wreck, looking as though a tornado had swept through it.

On the same subject also Mr. Money-Coutts, of Weybridge, wrote an interesting letter, from which the following is an extract:—"My own trees have suffered severely. In the field two oaks have shed several very large boughs, and one in front of my window has lost a bough 25 ft. long, leaving a wound on the trunk some 18 in. in diameter. A large ailanthus in the garden has been broken to pieces, while the standard roses have been much injured, in some cases nearly half the tree being split off. I noticed a birch tree which had been deprived of a large limb, and in many cases small boughs have been torn off, as if by a gale. In a gentleman's park close at hand hardly an oak remains uninjured, many being well-nigh spoilt. During all the morning the cracking of branches as they parted from the trunks could be heard in every direction."

In the North of England, and throughout Scotland, the snow-storm appears to have prevailed in a less hurtful degree; at least, no accounts of serious harm done to trees or plantations in these parts have yet reached us. In some of the higher parts of the country the snow has reached an unusual depth for October, but the lower and wooded districts of the North seem to have escaped the injuries inflicted by the heavy snowfall in the South. In the North, however, the snow-storm was followed by keen frost, of unusual severity for the month of October, and its worst effects will not be apparent until spring returns, when the fresh-budding trees will show what has been killed and what has survived. Such a spell of unseasonable weather must have retarded all forest work, and especially planting operations, which during the present month ought to be indefatigably pushed forward on every favourable opportunity. Trees should never be planted or transplanted when in anything approaching a frozen state; but the moment the ground is fairly thawed and the air above freezing point, every hand ought to be employed, and every nerve strained, to complete planting operations before severe weather again sets in.

In the course of the past month the coloration of the leafage of trees and shrubs has been developed in a more striking manner than usual under our cloudy skies. The ripening foliage has assumed its most beautiful tints, and made the autumn woodlands quite lovely with the varied shades of soft and brilliant colour everywhere depicted on tree and shrub. The soft mellow shades of the elegant lime tree, and the graceful sweet-scented birch, appear in the landscape like shapely pyramids of gold, the rich tints of which are toned down by the deeper yellow or orange of the adjacent horse and Spanish chestnuts. The warm umber-coloured leafage of the sycamore, and the deeper-toned beech, give the necessary graduation towards the rich brown or russety shades of the oak and the elm; while the whole tastefully blended with a setting of dark-green lofty pines, or heath-clad mountains, forms one of the most delightful of autumn landscapes that can charm the eye and interest the mind of the student of nature.

But it is not alone among the more prominent of the species of trees which adorn our woodlands that the deepest shades and richest tints of autumn colouring are to be found. Many of the lesser trees and lowly shrubs exhibit the most intense shades of colour in their ripening foliage. Who that has journeyed through a highland glen on a bright day in the waning autumn but has felt almost spellbound by the brilliancy displayed by the golden-leaved birch and the bright scarlet foliage of the mountain ash, forming thick bushy copses, or scattered high up the mountain slopes, like sentinels on the watch for the stealthy approach of the lurking foe? After a hot, dry summer, the foliage of the mountain ash assumes a brilliant scarlet colour, not equalled by any other native tree.

When associated in its native habitat with the golden yellow of the birch and aspen, and the darker shades of the oak and hazel, or the deep green of the native pine, the combination is invariably pleasing and attractive to the eye of the artist. To the keen arborist and lover of nature no period of the year is so thoroughly enjoyable as the autumn in the woods and fields, amidst trees and scenery of the loveliest description.

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Tree seeds have been harvested this autumn in fine condition; and although in many parts the crop has been a very partial one, in others it has been so abundant that no scarcity is likely to be felt. In the Southern and Midland counties, oaks and beech have been heavily laden, and the ash, elm, lime, sycamore, and such like, have borne abundant crops. Hollies and hawthorns are, however, in many instances, deficient of the loads of berries which they bore in the same places last year. We also hear that the crop of cones on larch, Scots fir, spruce, and other conifers, is rather scarce in many districts; but what has been produced is said to be of excellent quality. The newer conifers generally have been less productive of cones this season than for some years past. That is not a matter for regret, because the bearing of cones by young trees has more or less of a weakening tendency, and the plants raised from their seeds often prove unsatisfactory as trees. When possible, seeds of conifers, and indeed of all trees, should only be gathered from trees in vigorous health, and which have attained their full stature. Seeds obtained from trees in their prime are safe to produce a healthy and vigorous stock, while the progeny of under-aged, or sickly and decaying trees are generally of a weakly and degenerated nature. It often happens that such precocious and decrepit trees produce for a few years enormous crops of cones, and these find their way too readily into the wallet of the cone-gatherer. A strict superintendence ought to be exercised over the gatherers, so that they pick the cones only from healthy and well-grown trees. When seeds of any kind are collected, every precaution should be taken to preserve them, till sown, in as perfect and healthy a state as possible. Neglect in properly preserving them is certain to entail considerable loss, and is liable to induce a weak and degenerated progeny. Some seeds are better sown as soon as gathered. Others require to be stored away till a more favourable season, and these should never be allowed to lie in a heap to get heated, but be carefully spread out till dried sufficiently to keep sound, and then preserved in a cool, dry place till the season arrives for committing them to the ground. Too much importance can hardly be assigned to these matters by those who desire to obtain the best produce from the best seed.

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Of the numerous rich and varied natural products of Australia, the indigenous timber trees form an important section, which possesses a far wider range of interest than the limits of our Australian colonies. In all semi-tropical parts of the world the introduction of the trees of Australia generally proves a success, and the well-known economic qualities of many of them render their cultivation a desirable object, wherever the climate is of a nature favourable to their healthy development. The aptitude of some of them to thrive in a poor, dry soil and an arid climate, and of others to luxuriate in rich, marshy land and a malarious atmosphere, and their power to ameliorate the pestilential extremes of both wetness and dryness, are suggestive of their utility to the tree-planter in many countries where humanity suffers from the extremes of an ungenial climate. Still, from an economic point of view, the trees of Australia rank second to none for their value in the constructive arts. Indeed, for a few important purposes the timber of some of them stands unrivalled. It is, therefore, of considerable interest to the arboriculturist that he should be able to acquire a good knowledge of the nature and habits and the useful properties of the most important of these Australian trees. The latest attempt at furnishing this desirable information in a popular manner has been made by Mr. J. E. Brown, Conservator of Forests for the Government of South Australia, in exhibiting a choice selection of specimens of the wood of some of the principal timber trees indigenous to South Australia, at the International Exhibition now being held at Melbourne. The different specimens of wood which are exhibited are accompanied with illustrative pen-and ink sketches of the distinguishing characteristics of the various specie of trees, drawn with much ability by Mr. J. W. Love, Forester, as Wirrabara; and Mr. Brown has written a valuable pamphlet giving short and useful descriptions of the trees and the various uses to which their timber is applied.

From this *brochure* we learn that the "Red Gum" (*Eucalyptus rostrata*, Sch.) is the largest and most valuable tree in South Australia. The timber is of the most durable description, and the tree is found growing more or less common over the whole colony, wherever the soil is rich and contains plenty of moisture. It is chiefly gregarious, and when so it always predominates. It frequently ranges over 100 ft. in height and 8 to 10 ft. in diameter. The wood is of the finest quality, and possesses the rare properties of resisting the attacks of the white ant and the *Teredo navalis*. Weight, 53½ to 62½ lbs. per cubic foot; tensile strength from 14,000 to 21,500 lbs. per square inch. It is in general use for a great variety of purposes, the chief of which are railway sleepers, piles, telegraph poles, shipbuilding, fencing posts, bridges, wheelwrights' work, engine buffers, building works generally, and especially underground works.

The "Blue Gum" (*E. leucoxylon*, Mueller) is the most abundant tree in the colony. It is found growing solitary in some parts, but is generally gregarious with *E. rostrata*. The same species is known in Victoria and New South Wales as the "Ironbark tree." It has many varieties, one of which has drooping foliage and red flowers. The timber is much harder and heavier when green than that of *E. rostrata*, and when dry it is softer, but still retains its weight. It is somewhat pale yellow in colour, possesses great lateral strength, and is valuable for its durability. The principal uses to which it is applied are railway sleepers, beams, girders, telegraph poles, mining slabs, fencing purposes, felloes, bridge making and scantlings. Specific gravity, 63½ to 71 lbs. per cubic foot of air-dried wood. It grows to over 100 ft. in height and 3 to 4 ft. in diameter.

The "Sugar Gum" (*E. corynocalyx*, Mueller) is said to be chiefly used for railway sleepers, telegraph poles, slabs, posts and rails, felloes and scantlings. It is an excellent timber tree, and is found growing almost exclusively on the Flinders Range, at elevations ranging from 1,000 to 2,500 ft. above the sea; sometimes reaching over 120 ft. in height and 5 to 6 ft. in diameter. The timber is light in colour, straight grained, splits well, and has good tensile strength.

The "Box" tree (*E. hemiphloia*, Mueller) is found chiefly along the Flinders Range. It yields a valuable and heavy timber, of considerable durability. It is generally seen growing alone, but is sometimes found along with *E. odorata* and *E. leucoxylon*. It ranges from 80 to 90 ft. in height, and sometimes attains a diameter of 3 to 4 ft. It is used for railway sleepers, fencing, wheels, piles, slabs, planks, and similar purposes.

The "Peppermint" tree (*E. odorata*, Behr) is used for wheels, sleepers, posts for fencing, telegraph poles, and piles. It is a fine tree, attaining 60 to 70 ft. in height and 20 to 30 in., in diameter; not often gregarious, but when so, growing chiefly with *E. Behriana* and *E. hemiphloia*. The timber is hard, very durable, and of great weight.

The "Stringybark" (*E. obliqua*, L'Herit) has a light-coloured and easily split timber, and is found chiefly near the coast, on the Mount Lofty Ranges and in the South-east. It is a lofty tree, over 100 ft. in height and 3 to 4 ft. in diameter. It is used for fencing rails,

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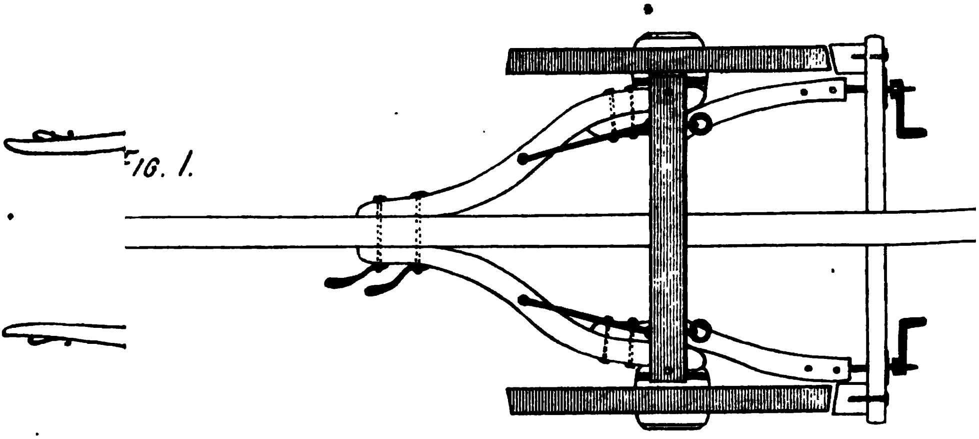

FIG. 1.

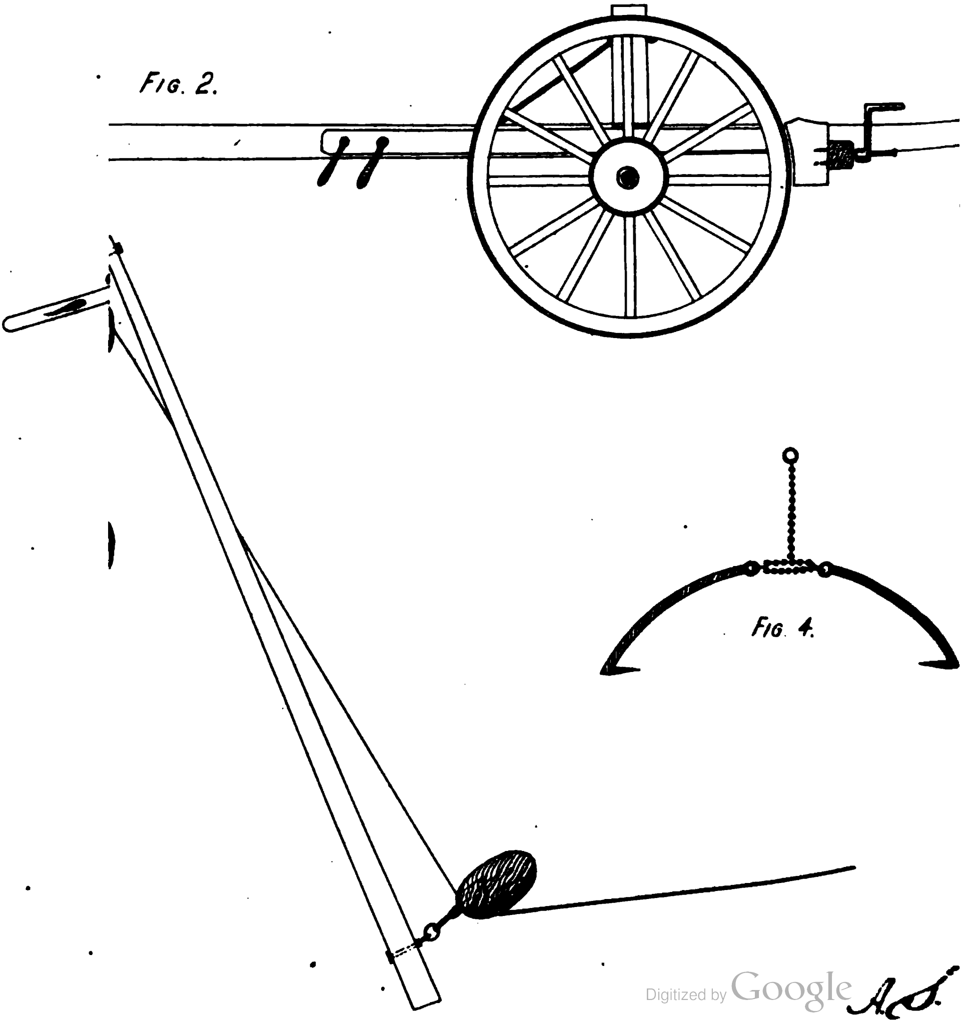

FIG. 2.

FIG. 4.

# Appliances used in Forestry.

By A. SLATER, Wyreside, Lancaster.

There are many operations to be conducted on estates which require a variety of different appliances for carrying out the work satisfactorily. It is therefore expedient for those in charge to have a fair knowledge of the machines required, and their modes of working, so that they may be advantageously utilized in executing the various undertakings committed to their care. I purpose in these pages to give a short description, and illustrate by diagrams, of a few of the machines or appliances used for estate purposes. In doing so, however, I do not suppose that anything will be advanced which is not already known to many who peruse this *Journal*, but the subject will be opened for discussion to those desirous of spreading a knowledge of appliances of a more complete description than those given here. The removal of timber is an important item of estate work, and the modes of conveying it from one place to another will form the first subject of this article. There are several machines used for that purpose; in England this generally being the "timber carriage," and in Scotland the single horse "wood carts," with at times the aid of a "janker." It will be obvious to those who have had experience in the working of the three foregoing conveyances that their combined use on many estates would be attended with advantage in the removal of the various classes of timber, and to those unacquainted with them this paper may be the means of showing their different merits.

In Figs. 1 and 2 are shown views of the timber carriage as used on many estates, and they are generally formed of a combination of oak, ash, and larch. In their construction, as well as in other machines, strength combined with lightness should always be kept in view. The front wheels of this carriage are 4 ft. 2 in. in diameter, and the back ones 4 ft. 6 in., the width of tire being 4 in. The pole may be about 20 ft. long by 6 in. by 5 in. at front, and 4½ in. square at the hinder end. The bolsters are 6½ in. thick, with a plate of 2 in. by ½ in. iron placed across their entire width, and sunk flush with their upper surface. The back bolster should stand 2 in. above the wheels, and the front one 4 in., and down through its centre passes a 1½ in. round bolt, and through an eye, formed on the end of an iron plate which is bolted on to the end of the pole; it then passes through the axle-tree, and is kept from working upward by a cotteril inserted in its end. By this arrangement the front wheels turn on the end of the pole, the upper section of the bolster being distinct from its bed underneath, which should slope slightly downward from the centre, so as to prevent the two surfaces from biting on each other when turning, and the upper part is kept from swinging round by the two iron stays which are shown to be bolted to the bolster and pole. Between the front part of the fore wheels is formed a shallow box for carrying chains, &c., the bottom of which is perforated with holes to prevent water from lodging therein, and into the cross bar in front of this, as well as on that on the end of the shafts, are bolted a couple of "eyes" on each, and a round iron rod is run through them, connecting the shafts with the waggon.

The brake is shown on the back of the hinder wheels, and is wrought by handles fitted on to screws bolted on to pieces of wood, which rest on the axle-tree, and secured as shown in the sketch. What is termed a "shoe" is sometimes used instead of this sort of a brake. It is formed of cast iron with "lugs" turned up on its sides, and having its width suited to the size of the wheels; a chain is fixed on to its end, the loose end of which is passed round one or more of the logs which forms the load, and when required the "shoe" is placed so that the wheel turns on to it, it being then dragged along the road with the wheel, and that part of the load resting upon it which serves as an effectual drag upon the whole.

Two or more horses are necessary for conveniently working this machine, and they are commonly yoked in front of each other, the consequence being, owing to the front horses being so far from the object to be drawn, a considerable waste of horse-power,—indeed, such loss may be safely stated at one-third, and the horses draw very unequally, especially on uneven ground. If it were convenient—but it seldom is in the majority of cases—the better plan would be to have double shafts to the waggon, so that two horses could be yoked abreast; in that case two steady-going horses would draw as great a weight as three would do yoked tandem fashion.

As to the means of loading, the triangle or three legs, as shown in Fig. 3, will be found the most serviceable, with iron blocks and chain, the top block having four sheaths and the lower one three; the loose end of the chain coming over the top pulley is passed through a snatch block, which should be hooked on to a ring bolted into the lower end of the middle leg; the timber which is to comprise the load having been dragged alongside the waggon, the two outside legs of the triangle being placed at one side, and the middle one with the snatch block attached at the other. A pair of "dogs," Fig. 4, are placed on the tree, so that it may be as nearly balanced as possible when lifted up; or if the log be a heavy one, they may be fixed at one end, and one end loaded at a time. The horse is then yoked to the end of the chain, and the tree raised a sufficient height; a man then takes hold of the chain, which he gradually slackens so as to allow the tree to drop gently on to the waggon. A handspike (Fig. 5), with a circular "dog" clasped or bolted on to it, will be found useful in assisting in turning the tree, if necessary, into its proper position on the bolsters; to prevent it from rolling off there should be iron pins inserted into each of their ends until the load is made up and properly secured in its place by chains.

Instead of the triangle, some use two strong poles, 12 or 15 feet in length; one end of each is laid and chained on to the top of the two side wheels, the other ends reaching outward from the waggon, forming an inclined plane; the timber to be loaded is dragged alongside their ends, and one end of a chain is fixed to the middle of the waggon pole, the other end is drawn under and over, or given a turn round the middle of the tree, and then passed across to the opposite side of the waggon; a horse is then yoked thereto, and the tree is thus easily rolled up the poles on to the waggon.

(*To be continued.*)

## GAULTHERIA SHALLON.

Often as I have included this useful plant in lists of American shrubs, yet it proves useful in so many ways that special attention must be drawn to it. Its popular designation of Creeping Winter-green conveys to the mind of those who are unacquainted with it some idea of its value for clothing bare surfaces under the drip of trees, which it does thoroughly, and its handsome thickly clustering foliage is always pleasing as thus seen. It spreads with considerable rapidity, and makes a capital edging to shrubbery paths. It forms pretty tufts in a border of perennials, and tells well in a rockery of bold and rugged character.

I have planted it in a variety of places and soils, and find it thrives everywhere. Yet while this proves how robust, hardy, and accommodating it is, it is also worthy of a select and prominent position for the attractive form in which it is then seen in June. Just now a tuft of it growing in a sheltered position at the foot of a rockery is one of the brightest gems of the garden, its foliage being almost concealed by the thickly clustering spikes of pure white heath-like flowers, having pink-tinged stems, and a curious pink down upon the calyxes.—Edward Luckhurst, in "*Journal of Horticulture.*"

# What Arable Lands is it Advisable to Plant?

By WILLIAM LIPSCOMBE, Heath, Wakefield.

Twelve months ago (at page 459, vol. iii.) I discussed this subject, having been prompted to do so by the deplorable results of the worst season ever experienced by farmers. Having now seen another season pass, which in some districts has hardly been less disastrous, it may be as well to recur to the question, for certainly the prospect for corn growing on the poorest arable lands has not brightened during the past twelve months. It will be seen that I dealt with the subject under two heads, namely, the undrained tenacious clays, and the barren sandy soils. I felt no doubt about the advisability of planting the latter for the reasons adduced:—1st. No cost of draining is necessary. 2nd. They are suitable to coniferæ. 3rd. They grow no rank vegetation, to clear which on strong soils adds much to the cost for several seasons. Furthermore, I pointed out that to the landlord (upon whose hands I supposed the lands under consideration to have been thrown) the task of improving poor sand land was, in an agricultural point of view, a much more hopeless proceeding than in the case of clay soils. I felt, therefore, that on such a soil an owner might be safely advised to resort to planting rather than to farm it himself.

Adverting then to stiff, undrained clays, which I assumed to be unlettable, I left the question a much more open one as to the course to be pursued, premising that some system of drainage was essential, whether agriculture or forestry were preferred.

I was somewhat disappointed to find the subject not followed up as I had hoped it might have been. Some contributors diverged from the starting-point, and left the distressed landlord, who was supposed to be waiting for counsel whether to cultivate or plant his arable land, "out in the cold," whilst side issues were discussed—such as the planting of ravines, moorlands, &c.

One important paper, however, on the subject from Mr. Tait (p. 629) raised a most material point as affecting the treatment of stiff clays, which was that he advised no drainage, except rounding the lands and deepening the furrows. As this would effect a saving of from £4 to £5 an acre in the prime cost of planting, all readers would, I think, be much benefited by having every possible information brought to bear upon this point. We shall all be agreed that anything is better than failure, and that if we do make up our minds to plant a crop, which cannot be reaped for thirty years, we should as far as practicable guard against the ordinary sources of disappointment in realizing such crops.

I should myself say that there was no such common cause of utter stagnation in tree growth, after the first eight or ten years, in clay soil, as the want of depth of drainage. It must be borne in mind that we are considering a clay soil for which a farming tenant cannot be found, so that it must be of the stiffest character. I have often noticed woods in a flat country which, when first planted, had evidently been drained at great cost by having an outfall brought up from a very considerable distance; by degrees the outfall had been allowed to be choked, and the water level in the woods gradually brought to within 18 or 20 inches of the surface, instead of from 3 to 4 feet, as reduced originally. So surely as this happens do the trees dwindle in their growth, just as choked drains cause grain to dwindle, and all healthy progress is at an end.

It will be seen by what I formerly stated that I by no means arrived at the happy conclusion that the returns would in every case pay satisfactory interest for the outlay which I deemed requisite if planting were adopted. The open drains which I recommend cost me £4 10s. an acre, and I put the planting and summer fallowing at about £5 10s., if using home-grown plants; together, £10 an acre. Can the £4 10s. be dispensed with, without running a great risk of ultimate failure? If I did venture to do so, I should neither plant larch nor spruce, as named by Mr. Tait, but substitute ash and alder, as by far more likely to succeed in stiff, undrained clay. But I confess I should plant with poor hopes of moderate success.

Who does not know the cold, perishing mist which, morning and evening, hangs over these tracts of saturated clay, beginning at the very fence where drainage ceases; and the white frost following in its wake, cutting to the marrow every tender shoot!

As so many proprietors are without nurseries, I regret that my remarks did not elicit nurserymen's contract prices in different parts of the kingdom for planting the two descriptions of soil, including maintenance for twelve months, and either to include all labour, or only superintendence. It is certain that such information would be most useful to many persons sorely perplexed how to deal with their poorest arable lands. If Mr. Editor thinks that this information might savour of advertising, the county or district could be given, without the nurseryman's name.

I have always shrunk from estimating the returns from planting, without an intimate knowledge of the district, as a measure of general utility. Any schoolboy could make the estimates which one often sees put forth as the sure reward to the spirited planter; indeed, I remember before I left school making such a calculation to my own great satisfaction, not, alas! realized in the forty years which have since elapsed. We all know the formula; so many plants to the acre to start with, then the first thinnings modestly calculated to pay expenses, the second to pay a gentle dividend, the third to make your mouth water, with a standard crop left of magnificent trees, number and size accurately set forth, left as an "El Dorado" for your children and grandchildren!

Since the larch disease became so common and yet so capricious, it has been much more difficult to arrive at an approximate estimate, even where coniferæ are alone planted. I fear we shall not find a substitute which can be expected to fill its place in all respects. Local demand and facility of transport are main factors in the disposal of most falls of wood; any one who travels about hears frequently that what is sought after in one district, is unsaleable in another. Then, as to the amount of produce capable of being raised on an acre, how astonishing is the influence of climate alone! What rugged ravine in England, skirted by barren moorland, could show such larch as I remember growing by the "Birks of Aberfeldy," so called by Burns, but which have given place to larch of glorious stature? And who that has not seen the pine woods of Switzerland or Savoy can credit the quantity of trees which can grow together, unthinned to maturity? Climatic influence is indeed one which cannot be studied too closely by the planter, but is one which the theorist entirely ignores in his facile conclusions of never-failing profits, whereas it may constitute all the difference between profit and loss on soils apparently similar.

Before concluding these remarks, I wish to endorse emphatically the statements which have recently appeared in this *Journal* as to the deterioration of Scotch fir supplied by many nurserymen. I would strongly advise all proprietors who possess well-grown trees of their own, to raise their own seed from the cones, and to substitute the Austrian pine seedlings from the nurseryman. There are few situations in which these will not flourish, and their free growth and rich colour add greatly to the beauty of young plantations, their hardihood in exposed positions being as remarkable among the pine tribe, as the sycamore is among the deciduous trees.

THE OLDEST TREE.—An American exchange says that the oldest tree in the world is in the sacred city Anarajapoora. It was planted 288 B.C., and therefore it is now 2,168 years old. The Buddhists believed it to be invested with wonderful sanctity. It is said that kings have dedicated their dominions in testimony of their belief that it is a branch of the same Og tree under which Gotama Buddha reclined when his apotheosis took place.

# The Oak (*Quercus*).

**Order Cupuliferæ, or Corylaceæ: distinctive organ a *cupule*, which is called a *husk* in the filbert, chestnut, and beech, and a *cup* in the oak; leaves alternate and simple, often veined from the midrib to the margin.**

By A. J. BURROWS, Pluckley, Kent.

This tree has probably a wider range than any other of the numerous timber trees upon the surface of the globe. In the northern hemisphere, and more particularly in Europe, it ranges over about 25 degrees of latitude, extending from the 35th to the 60th parallel. Familiarly known by its characteristic names of "king of the forest," "monarch of the woods," and the "Hercules of trees," it has received in all ages a fair share of that attention to which its majestic appearance and its pre-eminent usefulness entitle it.

Intimately associated as it is with our naval and, indeed, our national supremacy, its name has been used as a synonym for whatever is noble, staunch, and enduring.

The oak grows extensively in the northern parts of Asia and in North America, as well as in Africa. The bulk to which it attains upon suitable soils is enormous, as is shown by the dimensions of some of those oaks which have become historical, such as the Cowthorpe Oak, near Wetherby, in Yorkshire, which in 1768 was 40½ feet in circumference at 4 feet from the ground. Its height was 85 feet, and one large limb stretched out 48 feet from the trunk.

The Boddington Oak, in the vale of Gloucester, measured 42 feet in circumference at 3 feet from the ground, and at twice that height upwards of 36 feet. One growing in Earl Powis's park, near Ludlow was measured in 1757, and at 5 feet from the ground it was found to be over 16 feet in circumference, and the trunk ran up to a height of 60 feet before it sent out a branch.

The age to which the oak lives is proportioned to the dimensions it attains. Dryden, who had a great reverence for the oak, says of it,—

"Three centuries he grows, and three he stays
Supreme in state, and in three more decays."

But that its longevity is here very much underrated may be inferred from the fact that the dates found upon some of the trees felled in Sherwood Forest, and which were cut upon them when they had already attained a great size, prove that they had far exceeded the limits fixed by Dryden.

The Winfarthing Oak in Norfolk was of vast size, and as it was called "the Old Oak" in the time of the Conqueror, it is supposed to have attained the age of 1,500 years. The King Oak in Windsor Forest is upwards of 1,000 years old; and the Gelonos Oak, described by Grigor, and which grew near Newport in Monmouthshire, and was felled in 1810, is said to have contained 2,426 cubic feet of timber. It was sold standing for £405, and as the cost of conversion was £82, and it subsequently resold for £675, there remained a margin of profit amounting to £188.

The oak tree and its produce have figured prominently in the pages of chroniclers and historians from the earliest ages. According to Strabo the Romans depended for their supply upon hogs fatted upon masts in the woods of Gaul, and the Spaniards ground acorns into meal for making bread. The Norman kings of England, in order to create chases, took away from the people the right of pannage, which King John afterwards restored by his *charta de foresta*.

King Ina, at the end of the seventh century, gave laws to his Saxon subjects respecting the fatting of swine in woods; these were called the laws of *pawnage*, or *pannage*. The pannage of 200 hogs was in those days considered to be a fitting dower for a lady. Domesday Book shows that woods were valued not so much for their timber as for the number of hogs they would maintain; and so carefully was the survey taken that we find entries of "woods of one hog."

The picturesque effect produced by the oak is much greater when the tree grows upon a moderately good soil, such as that of the New Forest, than when it grows in very rich land. Gilpin says, "The point of picturesque perfection is when the tree has foliage enough to form a mass, and yet not so much as to hide the branches. One of the great ornaments of a tree is its ramification, which ought to appear here and there under the foliage, even when it is in full leaf. It is the want of this species of ramification which gives a heaviness to the beech."

Oak timber attains its greatest value upon a deep loam with a subsoil of clay. In size the oak ranges from the miniature tree of Dartmoor, 12 to 18 inches high, to the towering forest or park tree, from 70 to 100 feet in height. The regularity with which it springs up again in the plantation from a properly trimmed and rounded stool, makes it one of the most valuable of our coppice woods. In close plantations the taller trees are often found clear in the stem to a height of over 40 feet, and averaging from 9 to 12 feet in circumference.

The long and straight trunks of oak are especially valuable to the engineer and the architect, as well as to the shipbuilder for beams, waterways, and keelsons. The specific gravity of oak ranges from ·730 to ·900. Good oak timber is of a light brown colour, solid, and well able to resist the action of water. But the latter quality is said to depend very much upon its being winter-felled. As an instance of its durability in water we may mention the *Royal William*, which was built at Portsmouth between 1715 and 1719, and was taken to pieces in 1813, after a service of ninety-four years.

The market value of oak bark is generally considered a sufficient inducement to fall the tree in the spring, or as soon as the bark will run. Experiments by Sir Humphry Davy have established the fact that the average amount of tannin matter in bark from coppice oak is 32 per cent.; in medium-sized timber, 29 per cent.; and in winter-felled, only 21 per cent.

The weight of the bark from any given quantity of oak timber depends very much upon the situations and aspect, as well as upon the age of the trees at the time of felling and stripping. Trees grown in sheltered hollows having a southern aspect produce the heaviest bark; and the faster the growth of the tree the greater its produce of bark. A well-proportioned and flourishing tree will yield from five to six hundredweight of bark to every ton of measurable timber. In taking the average of trees containing about 10 feet each, it will be a safe calculation to estimate a ton of well-dried bark from every 150 feet of timber.

Upwards of 150 species of oak have been enumerated, but many of these may be considered to be mere varieties. Miller mentions twenty-six. Later writers have confined themselves to those which are either most useful in the arts or the most valuable as ornamental trees.

1. THE BRITISH OAK.—The indigenous oaks of Great Britain may be divided into three classes.

(1) *Quercus robur pedunculata* is generally admitted to be the most valuable of these. It is also the most common, being the species figured in the works of old authors. In this kind the footstalks both of the flowers and the acorns are long, and the petioles of the leaves short. The timber of this tree is not easily distinguishable from other varieties, though it is generally admitted to be more dense. The defects of cup and star-shake are also less frequent in it. In Europe it is found growing from Sweden to the shores of the Mediterranean, and it also flourishes in the north of Africa and the western parts of Asia. It is the most abundant oak in France as well as in Great Britain. Its tendency is to throw out very large limbs, and to become somewhat square in the top. But its habit of growth is very much dependent upon soil and situation.

(2) *Q. r. sessiliflora* has the footstalks of the acorns short and

those of the leaves long. The wood is but little if anything inferior to the former kind. It commonly attains a greater length of clear straight stem, but this is frequently much injured by both the cup and star-shake. Generally speaking it presents altogether a straighter growth of branches and a lighter aspect than the pedunculated oak. Some of the finest specimens of this kind are to be met with in Dean Forest, where they grow upon a rocky subsoil. They are, however, very generally dispersed among the other species in most of the forests of the countries mentioned above; and in Germany, where the soil is supposed to be most suitable to their growth, they preponderate.

(3) *Q. pubescens*, or the durmast oak, resembles in the footstalks of both the acorns and the leaves the *Q. sessiliflora*, but the under surface of the leaf is downy. This variety is not commonly met with, and its timber is of inferior quality. The leaves also hang upon the trees much longer than those of either of the former.

All the above kinds of oak may be freely raised from acorns, which should be gathered as soon as they fall from the trees, and either sown at once upon well-prepared beds or laid aside for spring planting. The largest acorns should be selected from trees of good proportions. A convenient size of bed is one about four feet wide. A bushel of good acorns, carefully planted and protected from vermin, may be expected to produce about 7,000 young trees. If, therefore, such a quantity be sown upon a bed 75 feet in length by 4 feet in breadth, each young tree will occupy an area of about 6 square inches.

Acorns sown at the end of October, or early in November, will rise in May. At the end of the second year the young plants may be removed into the nursery lines, allowing them from 15 to 18 inches between the rows, and about 6 inches from plant to plant. After two years in such situations they may be planted out in clean sites in the woodlands. But where larger trees are required either for the park or for the rougher forest quarters, such may be left some years longer in the nursery, being regularly undercut or transplanted to produce fibrous roots. Nurses of larch, Scotch, spruce, and silver fir, will at all times be valuable.

2. THE TURKEY OAK (*Q. cerris*) grows very extensively in the west of Asia, and also in France, Spain, Italy, and some parts of Austria. Its growth is more rapid than that of the British oak, but it does not attain a greater height, nor is it larger in its general dimensions. In situations where it is fairly sheltered from storms it produces a handsome, spreading park tree. Though extensively used in Turkey, both for shipbuilding and in house-fittings, its wood is not considered very durable. When well seasoned it makes good

cogs for wheels. It requires a dry and deep soil. This tree was introduced to England about 150 years ago. Very fine specimens of it are seen growing at Broussa, in Asia Minor. These are chiefly in the valleys, while upon the adjoining hills are found specimens of oaks closely resembling the *Quercus robur* of Britain. The leaves of this species grow upon very short footstalks, are oblong in shape, deeply and very unequally pinnatifid. The Lucombe or Devonshire oak is looked upon as being only a variety of the Turkey oak.

3. THE EVERGREEN OAK (*Q. ilex*) has leaves which may be described as oblong-ovate, and these are hoary upon the under side. It is a native of Southern France as well as of Italy and Spain, and is also common in the hill districts of Sicily, climbing the sides of Etna to a height of 3,200 feet. It will flourish near the sea-shore. In good situations in the south of England it attains a very considerable size, and it has been known to reach heights of from 70 to 80 feet. It is very common near Rome and Florence. Its foliage is of a dark rich green. It blossoms in May and June. The timber of the matured tree takes a fine polish, and it is therefore much used for furniture upon the Continent. It attains a large size in Northern Africa, but it does not flourish anywhere upon a very wet soil.

4. THE WHITE AMERICAN OAK (*Q. alba*) has oblong leaves which are deeply pinnatifid. It flourishes in most soils, but the finest specimens are to be found in Maryland. It grows freely between the latitudes of 28° and 46°. In the forest it attains a height of from 40 to 60 feet. The wood is of a pale reddish brown colour, straight in the grain, tough, and remarkably elastic. It is considered to be the best foreign oak timber which we import. In 1861 it was introduced to our dockyards as a substitute for British oak. It derives its name from the whitish colour of its bark. In this country it requires a good dry loam to grow it of large size. Loudon speaks of a specimen at Muswell Hill, which at 72 years old was 61 feet in height. This tree does not produce acorns in any abundance.

5. THE AMERICAN LIVE OAK (*Q. virens*) is an evergreen found in the southern states of North America, where it reaches a height of from 35 to 40 feet. Its timber is of a dark-brown colour, tough, hard, very heavy, and difficult to work. It is extensively used in the framing of ships, for wheel-cogs, and for carpenters' mallets. It is said to be stronger than any other kind of oak. Its acorns are small and oblong in shape, with very small cups. They are very sweet, and are in consequence used as food by the Indians, who frequently lay up a supply of them for the winter, and also extract an oil from them.

6. THE CANADIAN OAK (*Q. rubra*) is very straight in its growth,

and its timber comes to England in logs from 25 to 50 ft. long, and from 12 to 24 in. in the square. The wood grows slowly but works easily. It is used extensively by cabinet-makers, but is considered unfitted for building purposes. The bark is grey in colour and smooth. The leaves are large, often measuring as much as 6 in. by 2 in., and they retain their verdure until late in the autumn, being sometimes green up to Christmas.

7. THE SCARLET OAK (*Q. coccinea*), though considered by Miller as only a variety of *rubra*, is generally reckoned to be a distinct species. Its leaves grow upon long stalks, and are oblong and smooth. Of a shining green in summer, they become scarlet in the autumn. This tree grows abundantly in some of the United States, particularly in New Jersey, and also upon the shores of Lake Ontario. There it attains a height of 80 or 90 ft., with a diameter of upwards of 4 ft. It has a thick bark, which is of a dark colour. The wood is of but little use in commerce. In this country a light and dry soil is required for its successful growth. The tree has attained a height of over 50 ft. in Scotland.

8. THE CORK TREE (*Q. suber*).—Of these there are two kinds, the broad and narrow leaved, both of which are evergreens. When the trees are from twenty to thirty years old the outer coating of bark is carefully removed in July or August. This operation is afterwards performed every succeeding eight or ten years, and the third stripping is considered to be cork of the best quality. It requires great care not to break through or cut into the inner bark. One of the largest trees of this kind grew at Mamhead, in Devonshire. It was 60 ft. high, and 12 ft. in circumference. The cork tree is a native of the south of Europe, and it is said to have been introduced to England by the Duchess of Beaufort in 1699. It may be propagated from its acorns, which are generally sown singly in pots, and shifted from time to time until the plants are about 2 ft. high, when they may be finally transplanted. If kept for larger transplants, the formation of long tap-roots should be guarded against.

9. THE CHESTNUT-LEAVED OAK (*Q. prinus*) has been cultivated in Britain since 1830. There are two varieties, distinguished by the forms of the leaves, one kind being oblong and the other ovate. These trees attain a larger size than any other North American oaks. They have grey scaly bark and leaves of a bright green, which very closely resemble those of the chestnut. The timber is not of any great value. Michaux divides this species into the chestnut white, or marsh oak, which he describes as one of the most majestic trees of the North American forest, rising to a stature of 90 feet, with a straight, clear stem of 50 feet, crowned with an expansive summit; and the rock chestnut-leaved yellow oak, whose leaves bear the

closest resemblance to those of the Spanish chestnut. A smaller variety of chestnut oak rarely exceeds 30 inches in height, but it is so prolific that it is often seen weighed down by its thickly clustering acorns. American writers recommend the planting of this variety in order to provide food for game.

10. THE KERMES OAK (*Q. coccifera*) is a tree of low growth, and it may be better described as a bushy shrub. From it the ancients obtained the dye called coccus, with which they produced their scarlet colours. The tree is a native of France and Spain, and an evergreen. Its height is seldom beyond 20 feet, and it has much the appearance of a *Quercus ilex.* The leaves are smooth and oval, indented, and sometimes armed with small spines. They have short but strong footstalks. Miller says, "This is the oak from which the kermes or scarlet grain is collected, which is an insect that harbours on this tree."

11. THE ITALIAN OAK (*Q. esculus*) grows to a height of about 30 feet. Its branches are covered with bark of a purple colour; its leaves are smooth and deeply sinuated; its fruit sits very close to the branches, the cups being rough and prickly, and each containing an eatable acorn. This is the true "*esculus*" of Pliny. At one time the acorns of this tree were eaten either whole, or when ground into meal for bread, by the poorer classes in the south of France. The civic crowns of the Romans were made from the branches of this tree, and wreaths of it were used to crown the victors in their games.

12. THE SPANISH OAK (*Q. ægilops*) grows nearly as high as our common oak, its branches being very wide-spreading, and covered with a greyish bark. It is a native of the Levant, and is also found in Spain, Piedmont, and Dalmatia. The acorns are nearly buried in large scaly cups. They are used in dyeing.

13. THE BLACK OAK (*Q. nigra*) is found growing on poor land in America, where its height seldom exceeds 30 feet. Its bark is of a very dark colour. Its large smooth leaves are wedge-shaped, being broad at the top and narrowing to their base. Their colour is a shining green.

14. THE WILLOW-LEAVED OAK (*Q. phellos*) grows in North America, and the species is divided into two kinds,—one of which is called the Highland willow oak, with leaves shaped like those of the willow, and of a pale green colour. The other, which flourishes upon low and moist land, grows to a great height, becoming a fine timber tree.

Besides the species of oak above enumerated there are endless varieties. There are also other kinds which may be considered as hybrids, and which are commonly propagated by engrafting. One of these is the *Fulham Oak,* which is considered to be a hybrid between the Turkey oak and the cork tree. The original tree was a very fine specimen in the grounds of a nurseryman in Fulham, and which reached a height of over 80 feet. This kind may be grafted either upon the common or Turkey oak. The grafts grow very freely, often shooting out nearly four feet during the first summer. Many varieties have been propagated from the acorns of the original tree.

The *Lucombe Oak* is another hybrid propagated in the same manner. It is a sub-evergreen, and very rapid in its growth. Many fine specimens are to be found in the south of England. In foliage it resembles the Fulham oak. It grows in a spiral form, and becomes very pointed at the top.

*Turner's Oak* is another evergreen raised in Essex at the end of the last century. Its appearance conveys the impression of its being a hybrid between the common British oak and those of an evergreen kind. Like the others it is propagated by grafts. It grows rapidly in Scotland. During the summer its appearance is very similar to that of our common oak, but its distinctive character becomes more fully developed in the autumn.

## THE AREA OF THE GREATEST COLD IN EUROPE DURING THE PAST WINTER.

THE reports from various sources go to show that the area of the greatest cold in Europe during last winter, as in the very severe winter of 1709, was singularly delimited, and, in a manner of speaking, independent of altitude. In the neighbourhood of Paris and in the Lower Rhine valley it was most destructive, killing nearly all evergreen trees and shrubs, including the tender conifers, standard roses, and many other plants. During the period of the most intense cold in the regions indicated it was comparatively warm at St. Petersburg. In Switzerland, too, and northward through Eastern Germany, the cold did comparatively little injury. According to Dr. Regel (*Gartenflora*, p. 159), a thaw set in in January at St. Petersburg, and continued into the beginning of February, and was so great that the passage over the ice on the Neva was closed to vehicles. On the same authority, the lowest temperature in Western Europe was 22° R. (or 17·5° below Fahrenheit's zero). However, as late as the night of March 30th, the thermometer fell to within half a degree of Fahrenheit's zero, though the fruit-trees and ornamental trees and shrubs regarded as hardy there were not damaged. This was not so with herbaceous plants, many having perished in consequence of a deficiency in the covering of snow. Austria and Bohemia have suffered severely, and there is great distress amongst the poorer people in the wine-growing districts, both in these countries and in some parts of the Rhineland, and that, moreover, after two bad seasons.—*Gardener's Chronicle.*

# The Scottish Arboricultural Society.

## ANNUAL GENERAL MEETING.

The Twenty-seventh Annual General Meeting of the Scottish Arboricultural Society was held on Tuesday, 5th October, in the class-room of the Royal Botanic Gardens, Edinburgh. Robert Hutchison, Esq., of Carlowrie, Vice-president, in the unavoidable absence of the President, the Marquis of Lothian, occupied the chair, and among those present were Sir Robert Christison, Bart.; Professor Dickson, Edinburgh; Professor Balfour; Dr. Cleghorn; Mr. John Sadler, Curator Royal Botanic Gardens; Messrs. Gorrie, Rait Lodge; J. W. Barry, York; W. H. Rider, London; Wm. McCorquodale, Perth; John McGregor, Ladywell; D. Dewar, Beaufort; D. Scott, Darnaway; J. Robertson, Panmure; C. France, Penicuik; M. Dunn, Dalkeith; R. T. Macintosh, John Methven, James Welsh, Wm. Welsh, James Alexander, James Grieve, Hugh Fraser, Samuel Neil, Edinburgh; James Kay, Bute; John McLaren, Hopetoun; W. Robertson, Blinkbonny, &c., there being in all over seventy foresters and others present.

The Secretary, Mr. J. McLaren, jun., submitted a list of nearly seventy gentlemen nominated for election as members of the Society, and their election was duly confirmed.

## CHAIRMAN'S ADDRESS.

The Chairman in opening the proceedings of the meeting said:—

GENTLEMEN,—In the unavoidable absence of our noble President (the Marquis of Lothian), and also of our ex-President, Mr. Adam, I have been somewhat unexpectedly called upon to occupy the chair on this occasion, and before proceeding to discharge the duty that has thus devolved upon me, I must first express the regret which I am sure we all feel, not only for the absence of our President but for its cause—the state of Lady Lothian's health—which has compelled her ladyship and the marquis to proceed to foreign lands, and also our earnest hope that the change may prove beneficial, and that the marchioness may ere long be able to return to her native land in fully restored health. The absence of the ex-President of the Society, Mr. Adam, can hardly with propriety be described as an occasion for unmingled regret, for although we miss his genial presence and his encouraging words, we are proud to think of the high and honourable position which he has been called upon to fill; and we members of this Society will all follow our excellent Vice-President's career with a feeling of personal exultation and appropriation; and of one thing I feel sure that as we will never forget him, so in like manner he will remember us, and amid the strange and luxuriant vegetation of his tropical Presidency, his thoughts will often travel back to the woods and hills of his native land, and that the "Scottish Arboricultural Society" will be recalled to his memory.

Gentlemen, we have sent many of our rank and file in this Society, since its establishment, to honourable and responsible situations under the Indian Government, and whose devotion to duty and perseverance in the scientific development of forestry, have made the name and reputation of our Society not unknown beyond the realms of the British Empire, while our Transactions have been circulated in many a bungalow of the far East; but never till now has the Society had the high honour of claiming amongst its short list of Vice-Presidents the name of the Lieutenant-Governor of Madras. Let us hope that by the influence of Mr. Adam's name, and his kind interest in our welfare, that the prestige of this Society may be still further enhanced, and I feel sure that while we regret losing Mr. Adam's presence amongst us for a time, he goes to India's coral strand with the very best wishes we can give him for his health, happiness, and welfare.

It is now nine years since I had last the honour of addressing you from this chair, and during this interval of time the changes which have taken place both among the members of our Society and in the world outside, have been very striking and numerous. When I look around me and see the number of new faces, I am proud and pleased to consider the progress the Society has made, though, alas! the changes time has brought have not been all gain, for I miss many of those whose interest in our affairs was deepest, and whose services were most valuable. Still, as a Society we have grown and increased, and have made our existence and influence felt; and though the progress of arboriculture as a science is slow, and it does not advance by leaps and bounds, as is the case with some of the more exact sciences; and though, on the contrary, its growth resembles one of those giant monarchs of the forest, with whose culture it is concerned, inasmuch as it is slow and gradual and well-nigh imperceptible, yet in taking a retrospect extending over a series of years we see the progress that has been made in a more systematic and scientific treatment of our woods, and in a more thorough comprehension of the problems we have to solve, and the enemies with which we have to contend. And here I may remark that arboriculture, like every other science which deals with life in any form, has limitations unknown to those sciences which deal with inanimate matter, for life—life spiritual, life mental, life moral, life physical, and even life vegetable—is held by the Creator in His own hand, and in dealing with it in any of its numerous forms, we are speedily reminded of man's powerlessness. Take as an example the science of medicine. For centuries the intellects of some of our greatest minds have been taxed to discover some means of warding off disease, and holding death at bay, and with what result? Do men now spend lives free from sickness and suffering, and approaching to a millennium in length? On the contrary, do not suffering and pain still prevail, and are not threescore years and ten still the normal limit of human life? No doubt old diseases are banished by the altered and improved circumstances under which we live; but as they in their more loathsome and malignant forms are stamped out, new ones arise to reap the harvest of death, and medicine, victorious in one hard-fought field, has no respite to repose upon her laurels, but must turn to encounter new foes and unexpected assaults in sometimes unforeseen quarters. And it is somewhat the same with arboriculture, dealing as it too does with life, albeit of a much lower grade. New diseases and new enemies are constantly arising, and one difficulty overcome but leads the way to an encounter with a new foe. Of late years, besides very serious climatic disturbances, we have had to contend with a new form of disease on the spruce and the beech, and within the last week I have had my attention drawn to a blight upon old holly trees, and opinions are still divided both as to their cause and the best remedies to be adopted for their cure. Arboriculture is also hampered beyond most other sciences, from having no well-equipped school in this country in which it is scientifically taught, and few arboretums in which it can be studied. In this respect we in this country are far behind many of the other European nations; the forest schools of Germany and France, and now of Italy are well known; and even in Russia the necessity of improving their arboriculture is pressing upon the mind of the Government, distracted and harassed as it is with political and social dangers, of which in our happy, highly-favoured land we have no conception.

In Sweden the necessity for a proper management of the forests is so well understood that it has for long formed a regular part of the work of the Government, and there is a Forest Institute in Stockholm for the proper training of foresters. The course of instruction extends over two years, and is most complete and exhaustive. In America, also, public attention has been directed to the subject, and a bill for the establishment and maintenance of a School of Forestry at St. Paul, Minnesota, has been introduced into the Senate by Senator Macmillan; and it is surely high time that in this country something should be done towards providing a proper systematic training of our foresters, and a regular inspection of our woods. We surely may expect something to be done by the present Government, whose chief is a practical forester; and though his forte lies principally in cutting down trees, it is a necessary preliminary that there shall be trees to cut. Meantime, till the State shall do something in the matter we must do what we can for ourselves; and, after all, "self-help is the best help," and by means of the many useful manuals on the subject, and by the means of intercommunication afforded by the *Journal of Forestry* as our organ, and of training under some of the numerous experienced practical foresters, as well as by joining such a Society as our own "Arboricultural," our young men need not despair of becoming good foresters, and of raising themselves in the scale of their profession, and of fitting themselves for some of the posts in our Indian Forest Department, which at present receives more attention, and is better cared for, than in any other quarter of Her Majesty's dominions, provided they take an intelligent interest in their work, and have a real love for it, and a true desire to advance the sum of knowledge already existing on arboriculture.

I need not tell you that there is a very great difference between the man who does his day's work because it his work, and because he is conscientiously desirous of fulfilling his duty to his employer, and the man who works, not merely because it is his duty, but because it is his pleasure; because he is deeply interested in watching the phenomena which pass under his daily observation; in tracing effects up to causes, and in endeavouring to avail himself of the *why* and the *wherefore* of the many hidden processes of nature, to bring about such results as he deems desirable, and in this respect there is than arboriculture no wider field for observation and experiment; the soil most congenial to each description of tree; the circumstances of its location as to climate, shelter, &c.; and the period of the year most suitable for planting, transplanting, and pruning—yes, even of felling, and converting into useful timber. In regard to pruning I would here suggest observations as to the time in the month when it may be performed with least damage to the tree from bleeding. From observations I made some years ago I am inclined to think that during the winter months, or "dead months" in plant life, as they are called, about three days after full moon, the sap periodically rises, and circulates more vigorously, and consequently at that time the tree suffers more than it does if the operation of pruning were performed a week or two later. The circumstances which first drew my attention to this subject are these. I was making some alterations which necessitated very severe pruning, especially on a row of old sycamores; and as it was in the month of January I thought the risk of injury would be smaller than at any later period of the spring. My surprise was great, therefore, to find the bleeding so profuse as to threaten serious damage to the trees, and I was obliged to stop the operations. In ten days after, in pruning some other trees, I was surprised to find them perfectly free from bleeding, and I consequently returned to the sycamores, and had them tried again. They were perfectly dry, and the pruning went on successfully till the same period of next month came round, when the bleeding returned for a day or two and then ceased again, clearly showing that the sap was liable to periodicity in its flow. I have never seen this subject noticed or referred to in this country, and I would suggest to our foresters, especially to the younger members of the profession, that they should observe and experiment on the flow of sap, as, if there is a marked periodicity in it, not only pruning but planting operations should be modified to suit its recurrence. The American Indians, who like many other untutored savages, were very close observers of the phenomena of nature—though they might be unable to state their observations in a scientific form—were invariably accustomed to plant trees and shrubs with a waxing moon, and to prune and fell them with a waning moon. Doubtless, because they found when the moon is increasing the sap is rising in the trees, and when the moon is waning the sap is retiring.

Another point to which I would desire to call the attention and observation of all those who are interested in arboriculture is the fact that in some seasons some species of trees suffer most severely in their lower tiers of branches, others in their higher tiers and in their leading shoots, which points to the fact that in the one case the wood of the higher branches is first ripened and deserted by the sap; in the other case the wood of its lower branches is first ripened.

Whilst inspecting a mixed plantation of deodars, Wellingtonias, hollies, and other evergreens and coniferæ, &c., which were all in the same situation and in exactly the same position with regard to soil, altitude, and shelter, and which had all suffered severely from the severe frost of last winter, I was struck with the fact that while the hollies had all their lower side branches killed for three feet above the ground, and all above that level were untouched by the frost, the conifers, on the other hand, were uninjured in their lower tiers of branches, while their upper branches and leading shoots were killed back several feet, which seems to me to lead to the conclusion that whilst what may be called the *hard wooded* evergreen trees, such as hollies, ripen their *head* wood first, the conifers ripen their *older* side shoots and branches first, and would therefore seem to be more suitable for planting in damp, low-lying situations, where the evil to be most dreaded is the cold exhalations from the soil freezing on the branches near the ground, and the hollies would appear to be more appropriate for higher and more exposed situations where the keen wind and the clear frosty sky are the most deadly enemies to which vegetation is exposed. These and many kindred points offer a large field for investigation and observation, and though as yet we have no Government schools or forests to aid our investigations, we have woods and practical schools in every wood in abundance if we will only open our eyes and minds to what is taking place before us, draw our own deductions, and perform our own experiments. The great danger of the present day is that we are inclined to expect Government, or in other words, the public, to do too much while we ourselves do too little. Most men who have made their mark in the world have been mainly self-taught—too much assistance to the mind, like too much assistance to the body, is weakening and enervating; it is not by being constantly kept in arms and carried about that a child's limbs are strengthened and that it learns to walk—it is by being laid down and allowed to kick and sprawl, and totter from chair to chair, that by degrees it becomes a strong man, not without many a tumble by the way; and in like manner it is not by having everything explained to us without any trouble on our part, that we become proficient in any study; it is by thinking and observing for ourselves, by making many mistakes and blunders, and often having to retrace our steps and begin again, that progress at last is made, and that discoveries and improvements are brought about. One fact elicited by a man's own observation is more valuable than a hundred laid before him by others; for in the process of finding it out for himself, his mental faculties are exercised and strengthened, and the path is opened for farther and wider range of discovery. I cannot express the meaning more clearly of what I have in this address endeavoured to inculcate, than by concluding in the words of a recently-delivered eloquent address by a distinguished statesman of the present day: "Further let them bear in mind that however excellent the system by which they were taught, they could not expect to succeed in life merely by making themselves acquainted with rules and illustrations. These things must never be allowed to prevent the exercise of individual energy and intelligence. Our ancestors, in many cases under great disturbances, without any of the aids we have, fought their way through, and made Englishmen what they are, and England what she is. Do not allow yourselves to be so trammelled by rules, and so led to lean upon technical instruction, and let me say, as another caution, to lean upon what Government, or parliament, or benevolent instructions and teachers and classes may do for you, as to forget what it is you have to do for yourselves. All these things are like fire—excellent as servants, but fatal as masters; and, remember this, that if you are to succeed in your work, it must be by the exertion of your own energies and your own intelligence, by cultivating above all things, the spirit of individual self-reliance." Let us all ever bear this advice in mind, and throw our whole soul and energies into our work:—

"Let us then be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labour and to wait."

On the motion of Professor Balfour a hearty vote of thanks was accorded to Mr. Hutchison for his admirable address, a compliment which was duly acknowledged.

The minutes of meetings of Council were read and approved. Nothing appeared in them of general interest if we except the fact that Mr. Turnbull Smith, C.A., Edinburgh, who had made a thorough investigation and report upon the financial condition of the Society, had done this free of charge, as an evidence of his interest in the Society. A vote of thanks to Mr. Turnbull Smith for his kindness was passed unanimously.

**Mr. McLaren**, secretary and treasurer, read the report of the auditor on the Society's financial affairs, which showed that the charge during the past year had been £586 19s. 7d., of which £137 2s. was subscriptions, £34 13s. life membership, £11 3s. donations, and £347 1s. 4½d. the funds of the Society. The discharge was £586 9s. 7d., of which £21 3s. was for prizes, £10 for meteorological observations, £20 salary of secretary and treasurer, printing Transactions, &c., £143 12s. 2½d., funds of the Society £347 1s. 4½d. The sinking fund amounted to £327 5s.

The report was approved of.

The report of the Society's summer excursion to Dolphinton, Tweeddale, and Penicuik was laid on the table and approved of.

### THE COMPETITIVE ESSAYS.

**Dr. Cleghorn**, of Stravithie, convener of the judges' committee, submitted the report on the competitive essays and specimens sent in during the year. On the sealed envelopes being opened the following were found to be the successful competitors:—

I. On the comparative value of timber as affected by altitude of situation; by Thomas Wilkie, forester, Ardkinglas, Inverary. Bronze medal.

II. On the system of oak coppice management recently adopted; by Thomas Wilkie. No. 2 silver medal. The author recommends that owing to depreciation in value of oak bark, oak coppice should be converted into a timber crop with standards at regular intervals.

III. On the Larch Bug, its origin and prevention; by William Harrower, forester, Cahir Estate, Tipperary. 1st class silver medal. The author attributes the mischief mainly to bad seed and careless treatment in the nursery.

IV. On the cause of the deterioration of Spruce plantations during the past three years; by Thomas Wilkie. Bronze medal. The author attributes the deterioration of Spruce plantations to fungi, cold winds, frost, insects, general weakness and atmospheric gases.

V. On the cause of disease on Beech hedges in various parts of Scotland during the past two seasons; by Robert Hutchison, of Carlowrie. 1st class silver medal. The author refers the evil to the prevalence of prodigious numbers of an undescribed aphis, and urges the importance of preserving insectivorous birds and other natural foes, such as ants, lady-birds, &c.

VI. On the rearing and management of Hardwood plantations; by Thomas Wilkie. Commendation, as it is a short paper, supplementary to a report recently published in the Transactions.

VII. On the rearing and management of Hardwood plantations; by David Tait, forester, Owston Park, Doncaster. 1st class silver medal and £2 (prize given by Mr. A. Mackenzie, Great Winchester Street Buildings, London). A practical paper stating concisely the method of draining, planting, thinning and pruning. Most of the remarks as to common errors of over or under thinning, &c., are good.

VIII. On live fences, with special reference to the best seasons for cutting them; by Thomas Wilkie. 2nd class silver medal. A good essay, brief but containing useful information and supporting his views by sound arguments.

IX. On the various modes of enclosing plantations; by Andrew Slater, overseer, Wyreside Cottage, Lancaster. A gold medal. An excellent essay, well written, illustrated by eighteen drawings and enhanced in value by approximate estimates of the comparative cost of the various kind of fences.

X. On the cultivation of the medicinal cinchona plant, yielding the Peruvian Bark of commerce; by John Ferguson, Deputy Conservator of Forests, Nelambur, Mungerry, India. The judges conferred as to the admissibility of this essay, the culture of the cinchona scarcely coming within the scope of the Scottish Arboricultural Society. But considering that Indian forest officers have twice been called on to report on the best method of producing the largest quantity of bark, the judges have taken a broad view and adjudicated a gold medal.

In remarks appended to the report the judges stated that there were two more essays than last year, although no report was given in for the prize offered by the proprietors of the *Journal of Forestry* "upon the value of tree planting as an investment," and they hoped that the prize would be renewed. Five essays were written by one candidate this has happened on several occasions), and these were short and imperfect. The judges strongly recommended the candidates to concentrate their efforts on one or two subjects.

XII. A collection of woods, No. of specimens 200, showing in many cases transverse and longitudinal sections, and including many trees and shrubs of high interest; by James Berry, forester, Stevenstone Estate, Torrington, North Devon. A gold medal.

XIII. Collection of 22 kinds of wood in longitudinal section; by George Berry, Horningsham, Warminster. 2nd class silver medal.

The judges considered that it would be advisable that the Council should recommend some uniform method of preparing sections of woods.

The report was adopted and thanks accorded to the committe.

### ELECTION OF OFFICE BEARERS.

The **Chairman** proposed the re-election of the Marquis of Lothian as President of the Society. He read a letter from his lordship expressing regret that it would be impossible for him to be present at the meeting on account of Lady Lothian's health.

The motion was carried by acclamation and the following other office bearers were elected:—

**Vice-Presidents.**—Hugh Cleghorn, M.D., F.R.S.E., of Stravithie, St. Andrews; John Hutton Balfour, M.D., M.A., F.R.SS.L. & E., *Emeritus* Professor of Botany, Edinburgh; The Right Hon. W. P. Adam, of Blairadam, M.P.; Robert Hutchison, Esq., F.R.S.E., of Carlowrie, Kirkliston; John McGregor, Forester, Ladywell, Dunkeld. COUNCIL:—William M'Corquodale, Forester and Wood Surveyor, Scone, Perth; John Lamont, of Messrs. Lamont and Son, The Glen Nurseries, Musselburgh; James Alexander, jun., of Messrs. Dicksons and Co., Edinburgh; John Anderson, Nurseryman and Seedsman, Perth; John M'Laren, Forester, Hopetoun House, South Queensferry; James Robertson, Forester, Panmure House, Carnoustie; D. F. M'Kenzie, Forester, Murthly Castle, Perthshire; Colin J. Mackenzie, Esq., of Portmore, Eddleston, Peebles; William Craig, M.D., C.M., F.R.S.E., 7, Lothian Road, Edinburgh; John Sadler, Curator, Royal Botanic Garden, Edinburgh; Charles S. France, Overseer, Penicuik House, Penicuik; D. Scott, Wood Manager, Darnaway Castle, Forres; Daniel Dewar, Forester, Beaufort Castle, Beauly; James Kay, Wood Manager, Bute Estate, Rothesay; Malcolm Dunn, The Palace Gardens, Dalkeith. SECRETARY AND TREASURER—John M'Laren, jun. AUDITOR—John Ord Mackenzie, Esq., of Dolphinton, W.S.

### THE PROPOSED ROYAL CHARTER.

The CHAIRMAN verbally reported that he had prosecuted his inquiries regarding the obtaining of a Royal Charter for the Society. All other difficulties being out of the way the cost would be £100, and he did not think it would be judicious to incur that expense in the present state of the Society's funds. The matter was left in the hands of the Council.

### REPORT ON EDUCATION.

DR. CLEGHORN submitted the Report of the Committee on Education. The committee set out by the remark that the present report was preliminary, and then went on to describe the existing state of things as to the education of foresters. Hitherto, in Scotland, it may be said that the education of a forester has been obtained in the first place at the parish school, and after passing through its classes with more or less credit he has received what professional or technical knowledge he possesses in the woods, where he has found employment, and from the few books on the subject accessible to him. No special advantages have been within his reach for acquiring a knowledge of botany, geology, chemistry, meteorology, or other important and cognate sciences. No doubt many excellent practical men have been trained under this system, but when the standard of education throughout the country has been raised, and forestry is becoming a science as well as an art, a higher standard of attainment for foresters is also required, combining theoretical knowledge with practical skill. After a reference to the limited amount of success which has attended the Highland and Agricultural Society's scheme of examinations for certificates, which might have arisen from the want of a defined system of preliminary education, it was pointed out that the Society, owing to the want of a charter, could not grant certificates or diplomas. The committee, therefore, suggested the following outline of studies applicable to young foresters in this country which might be generally attained in their various localities at higher grade schools, or by private study.

1. English, including orthography, writing from dictation, composition, geography.
2. Arithmetic and book-keeping.
3. Geometry (first four and the sixth books of Euclid).
4. Plan drawing.
5. Surveying and land and timber measuring.
6. Mechanics as applied to the construction of buildings, fences, roads, and bridges, and the strength of materials.
7. Elements of botany, chemistry, and geology.

The following text-books are named as likely, among others, to prove useful in the prosecution of a course of study such as that indicated. FORESTRY. (1) Treatise on Planting (Forsyth); Library of Useful Knowledge. (2) Loudon's Trees and Shrubs. (3) Brown's Forester. (4) Lindley's Theory and Practice of Horticulture. BOTANY. (1) Balfour's Elements of Botany. (2) Low's Landed Property. LAND AND TIMBER MEASURING. (1) Ewart's Agricultural Assistant. (2) Strachan's Agricultural Tables. BOOK-KEEPING. (1) Chambers's Book-keeping. As to the question of a Forest Training School, that required so much careful deliberation that the committee could only suggest that they should be re-appointed for further inquiry and report. The report concluded as follows:—"As the necessity of preserving the woodlands is becoming evident in all our colonies, the want of trained foresters is more and more felt abroad, but the main question for us is, 'What number of young men is really required for our own country?' 'Is it sufficient to warrant the establishment of a special school, and if so where should it be?' Some of our most experienced members have assumed that the school should be established in Edinburgh in connection with the new Arboretum; but without offering an opinion the committee draw attention to the fact that the judgment of other countries, more dependent than we are on home-grown forest produce, has established forest schools without exception in forest districts where there is abundant material for studying the practical branches on a large scale in the State Forests or Government Domains. Thus the school in France is at Nancy; in Saxony at Narandt; in Bavaria at Aschaffenburg; in Italy at Vallombrosa; and in India at Dehra Dun. The main points for inquiry which occur to the committee will be the probable number of young men who will seek to avail themselves of the advantages of the forest school, and the most suitable locality for its establishment. And should such an institution be called into existence it will gain and not lose by our all having time to deliberate regarding its future organization."

MR. CHARLES S. FRANCE, Penicuik, moved the adoption of the report. Looking, he said, to the state of forestry in the country and knowing the condition of foresters at the present time and the requirements of arboricultural science, it was rather a hard thing for the committee to lay down hard and fast lines on forest education. In their report the committee had, however, afforded an opportunity to young men of learning a cheap and easy method of forming the basis or groundwork of a good forest education, looking forward to its being augmented some day by the training to be acquired in any establishment that might be instituted in the country, such as a forest school in connection with the Edinburgh Arboretum. He suggested that the committee should send out to members of the Society a circular containing a series of queries to be answered, so as to obtain their opinion as to the best means of study and the cost of it for young foresters. The Society, by putting its shoulder to the wheel and working up from small things to great, might not only improve the educational but the professional status of foresters. (Hear, hear.)

MR. J. SADLER, in seconding the motion, said that it had always struck him that the education of foresters and assistant foresters had been made too much of. What they wanted to educate people to was common sense. Any young man who wanted to aspire to any appointment in his profession, depend upon it, educated himself. He did not think he would live to see the day when there was a forest school in operation like that desired by some. The best forest school was common sense and the power of observation under whatever circumstances the forester might be placed. They did not require to go to the Continent for a pattern of a forest school with humbugging lectures; what was wanted was the training of foresters in when to use the axe and saw, in what to plant and not to plant, and when and where to plant. Good practical men who took an interest in their work would anywhere pick up whatever would be of use to themselves in after life. (Applause.)

MR. M. DUNN commended the idea of eliciting from members and others interested in arboricultural education an extended opinion upon the subject by means of circulars, and the report having been adopted the subject was remitted back to the committee with full powers.

### DETERIORATION OF LARCH AND SPRUCE.

MR. JOHN MCGREGOR, Ladywell, opened the discussion fixed at last meeting upon "The deterioration of Larch and Spruce in this country," by a paper in which he devoted special attention to the cause and effect of what is now commonly known as "blister." The cause of blister he set out by stating was the insect known by such various names as "the larch insect," *aphis laricio*, *adelges laricio*, *larch bug*, *chermes pini*, &c. In support of this contention he quoted a large number of authorities including Loudon, who said that the insect first appeared in the Athole plantations in 1785; Webster, Highland Society's Transactions; Gilpin, Selby, &c. In the majority of the authorities quoted it appeared that, severe frost, cold winds, or frosty fogs, were experienced before or when the insect was doing most mischief. Mr. McGregor then went on to give an interesting sketch of the life history of the insect, tracing its career through various generations, and pointing out the specific injury done by each generation. He illustrated his remarks by branches and sections of trees, showing the effects of the attacks of the aphis; pointing out that a small fungus, which he believed to be a variety of *Pisina capcina*, was found in greater abundance on the blistered patches of the bark than on those parts not affected. The remedial measures for this insectivorous plague ought to begin in the nursery. So far as possible no plant containing a vestige or even appearance of the insect should be planted out.

Mr. Gorrie said that in his opinion the aphis, although very destructive to the larch, had nothing to do with the blisters, which he considered were caused by late spring and early autumn frosts. He remembered coming from Huntly, where he had been planting largely for the Duke of Richmond. It was in the middle of May, and there was a very severe frost with a snow fall. All the way from Huntly to Aberdeen the larch trees in full leaf were festooned with snow. As the sun got up it melted the snow, and the leaves assumed a flaccid appearance as if destroyed by frost. In the autumn of the same year he happened to pass through the plantation and then he saw many of the trees fairly killed by the frost, and those not killed outright were showing blisters in all stages of the growth of the tree. Aphis attacked very young trees, and there they saw the work of the insect without any trace whatever of blister; whereas they could see young trees blistered that had been affected by frost. Experience only confirmed his opinion that the aphis had nothing to do with the blistering of the larch.

Mr. C. S. France having expressed the hope that the Society would print Mr. McGregor's paper, as it would prove of the greatest possible use to foresters, went on to say that he failed to see any true description of the objects of the discussion which were the causes of the deterioration of the larch and spruce. Mr. McGregor was pretty near the mark as to the diagnosis of disease, but the question was, had larch deteriorated in value or growth and had it thereby prevented proprietors planting larch as a crop. He concurred with Mr. Gorrie that blister was not caused by the coccus but by frost, and that the coccus was the outcome of an unhealthy condition of the plant caused by frost. As to the deterioration of larch, he pointed out that although the blight upon larch was discovered by the Duke of Athole in 1795, the trees still standing were particularly fine specimens. He believed that if in a healthy condition, and planted under suitable conditions, the larch outlived the weakness of constitution arising from the causes mentioned. The great deterioration of larch arose from it being planted in many places for which it was not adapted. Larch in itself had not deteriorated, and if planted as near as possible to its natural habitat, even though attacked by blight or blister, the plant would gradually outlive these. He had met with larch trees cut down which contained hollows left by the blister thirty or forty years before.

Mr. McGregor said he had simply treated blister as the most serious blight upon the larch. He would not say that there were not more insects now than when the larch was first planted, but at Dunkeld they would not find trees with blisters until 20 feet high.

Mr. J. Kay, Mount Stuart, Bute, endorsed Mr. Gorrie's statement regarding blister. He had observed, so far back as twenty years ago, that the blister was uniformly on the south side of the tree or nearly so. It was not caused by the frost alone. They had the frost first, then often after a severe frost in spring there was bright sunshine through the day. The blister was caused by the severe frost at night, and the bright sunshine during the day, and this was proved by the blisters appearing for the most part on the south side of the tree.

**Mr. J. Sadler** said that he never found the blister without the aphis, although he did not say that the aphis was not there without the blister. The specimens on the table showed blister and aphis, and in two or three cases they could still trace the punctures through the formative cells into the soft wood. Whether that was caused by the aphis he did not know, but the insects seemed to be very fond of blisters. (Laughter.) They knew that last year insect life had been very abundant on vegetation. The beeches had had the very life sucked out of them. Some said that it was the effects of smoke. That was humbug; it was the beech aphis, for the blight was as bad 100 miles away from smoke as it was within 500 yards of the origin of the smoke. Thousands of larch and spruce had been killed and cut down many miles distant from any smoke, not by insects alone but by the over-absorption of moisture. The roots took up more moisture than the leaves could give off.

**Mr. John W. Barry**, of Fylingdales, Yorkshire, said that in endeavouring to trace the remoter causes of the disease in spruce he was forced to the opinion that that tree being a thoroughly continental plant was opposed to our insular climate. The disease appeared more virulent when the conditions of our climate varied most from those in which the spruce was naturally found. As confirming this opinion he stated that in its own climate the spruce was found in every variety of soil—even on barren rocks and on sand, whereas in this country it was extremely particular in the soil in which it would grow.

**Mr. W. M'Corquodale** believed that there were two causes of the larch blight. First, late frosts in spring or early summer when the larch was in foliage. On the best of soils he had seen, after a severe night's frost and after the summer sun had beat in upon the trees, the foliage getting in two or three days quite brown. If this took place two or three years in succession it killed the larch outright. On the other hand, the aphis was very destructive, and would even affect plants in the seed bed. On one occasion he got some foreign seed from the Tyrol. It was in the year 1840, and he reared the seed in a nursery apart from other larch, and when two years transplanted they were planted out in a new plantation by themselves, with home larch intermixed with Scots firs alongside them. The Tyrol seed were the first that were destroyed by the aphis. The aphis attacks larch in seed beds, but it is more destructive some years than others. They fix themselves on the foliage, at the extreme points of the branches, and on summer afternoons when the sun is shining brightly they could see the trees glistening as if with dew—that was their own sap escaping from the punctures made by the aphis, and the trees were in fact bleeding to death. It was the extreme points of the branches that were attacked. These points dried up, and the sap could not circulate throughout the whole tree and was therefore thrown back on the bole sap vessels. These vessels burst and gave rise to ulcerations in the boles. He never saw a larch thirty-five or forty years of age destroyed. After that age they generally withstood the effects of the aphis. He was quite of opinion that the aphis would destroy larch trees even supposing they were not affected by frost. Some people held that it was caused by the want of drainage. There might be a good deal in that on wet ground, but he knew dry sandy ground where not a particle of water would remain, and these were the very worst places. A plantation of larch near his own house was a case in point. There the trees were attacked very much by aphis and yet the soil was as dry as could be. He tried some experiments. He got a solution of lime and water, and by means of an engine threw it up to the tops of the trees until they were perfectly white. But that had no effect on the aphis; he had also tried other remedies, but the result was that the cure was worse than the disease. As to the effect upon the roots of trees, he had seen trees twenty or thirty years of age on dry soils with the extreme points of the branches dying away. Then the trees died away from the top down to the roots, with the latter still perfectly fresh. The roots were the last to give way, while the bole was fresh and healthy till all the branches were dead.

MR. J. METHVEN, Edinburgh, endorsed the remarks made by Mr. M'Corquodale as to the effects of aphis on young seedling larches. He had observed that they were attacked more readily in dry weather, especially if accompanied by hard, parching wind and bright sun. Last season was one of the brightest on record, and the larch, both in seed beds and lines, were not attacked by the aphis. This year the young larch were threatened with the aphis, no doubt on account of the dry winds in May and June. Even in seedling beds the aphis attacked the larch, but in succeeding months, with beautiful weather and genial showers, the aphis entirely disappeared. As Mr. M'Corquodale had said, the seed received from the Tyrol was certainly more susceptible to disease than larch raised from home-grown trees. In frosty weather only ten out of every hundred of the plants raised from Tyrol seed survived—he meant that the remainder were rendered useless by the tops being frosted. Of the home grown seed 90 per cent. survived the effects of frost. He had no doubt that if the young trees grown from Tyrol seed survived two years and were then planted out, frost would not effect them so much. Certainly in seedling beds late spring frosts rendered them totally useless. The aphis attacked the larch more severely when there was strong frost in the air and sunshine above.

MR. M. DUNN did not question the ability of foreign seed to stand our climate and insects. It might be quite possible that the variations of larch and spruce were to a great extent bronght on by the use of weakened seed—whether home or foreign was not the question. They had heard a great deal as to the cause of certain diseases in the larch and spruce, but very little as to whether larch and spruce had deteriorated. His contention was that both larch and spruce were at the present moment, when properly grown and treated, a still more valuable crop to proprietors than formerly. The injury to such trees might arise from blight, but very often from want of judgment in the selection of proper sites for the plantations. The remedy he maintained to be "educate, educate, educate;" and with education progressing fewer such mistakes would be made. He did not mean to say that they could prevent frosts occurring or insects living and multiplying. But from pretty wide experience of insect life, he held that it was a matter of chance whether they attacked healthy or unhealthy life. In dry, parched weather, the insects made wonderful attacks and increased rapidly, but in close, muggy, wet weather, they disappeared in an incredibly short time. He had seen plants infested, nay, covered with myriads of aphis, and yet not one could be seen after a cold wet day. If we could only "turn on" a cold wet day, as occasion demanded, they would soon get rid of the aphis.

**Mr. M'Corquodale** said that a good deal of the failure of the larch was owing to moorish land not being properly drained. If moorish land is well drained before being planted, larch will succeed. A great mistake was to allow young plantations to grow up too crowded. They ought to be thinned, and let light and air into them. He did not believe that the larch had depreciated in this country a bit.

**Mr. Baxter**, Dalkeith, said that many people in observing the sad exuding from wounds made by the aphis would be apt to exclaim that there the larch had become deteriorated. Yet in such cases he had seen the wounds heal up, and although the trees were a little deformed they had apparently got over the effects of their wounds. He quite agreed with Mr. M'Corquodale about thinning. Where well thinned, he had seen larch grow up perfectly healthy, but when permitted to grow too thickly they speedily became unhealthy.

Mr. W. W. **Robertson**, Blinkbonny, said that there was a great difference in the quality of the foreign seed of larch. For instance, in June, 1877, there was a severe frost—ten degrees below the freezing point—and 50 per cent. of the trees from seed procured from Hamburg were destroyed while those from Tyrol seed escaped unhurt.

The Chairman, in summing up the discussion, said that the Society was indebted to the members who had brought up this question. The opinion seemed pretty general, that not only had the aphis to do with disease in the larch but also the weather. He himself believed that bright sunshine after a frosty night had a great deal to do with it. The weather, so inimical to the larch trees, was also very conducive to the propagation of the aphis which, moreover, could stand any amount of cold, whereas, the larch would not. Perhaps that was the reason why the larch became liable to the effects of the aphis.

### APHIS ON THE BEECH.

**Sir Robert Christison** said that it was pretty well known that the beech had been affected to an extraordinary degree in the neighbourhood of Edinburgh by the insect tribe. His attention had been drawn to it incidentally at Craigie Hall, where there were a number of very fine beeches of great size, and there for the first time the disease had been seen affecting large trees. Observations had been previously confined to beech hedges, which in many cases had been utterly destroyed. He had been struck with a remarkable deficiency in the foliage in some of the large beeches to which he had referred, and he had ascribed that to the frosty weather in spring. On closer examination, however, he found that the injury was due to the presence of more than one insect. In many cases every pair of leaves were fixed together by a fine network, and on opening them he discovered not the ordinary yellow aphis but a very conspicuous grub. On returning afterwards with Mr. Sadler to inspect these chrysalis he found that they had all disappeared, but that the branches were covered with an infinite number of insects which to him were new—rather long-shaped and with transparent wings, but not like the moths produced, for example, on the oak. Leaves and twigs were perfectly covered with unnumbered myriads of these creatures, but all of them were disinclined to take to their wings. All the parts of the tree which had been so affected had cast their leaves unusually early. He had also noticed a similar disease on a beech in the Botanic Gardens.

In answer to Mr. M'Corquodale, Sir Robert added that he noticed nothing peculiar about the bole. The only thing he saw on the bole was the ordinary wood insects.

**Mr. France** said that he had noticed a peculiar kind of green aphis on the beeches during the past two or three years, and at Penicuik the hedges had been completely killed by it. One peculiarity of this aphis was that its ravages killed not merely the branch attacked but the whole plant.

**Mr. M'Corquodale** asked if Mr. France believed that insects killed the beech right out, why he did not believe that insects killed the larch right out. (Laughter.)

**Mr. France** said he would like that to be shown. (Laughter.)

**Mr. M'Corquodale** believed that when trees were attacked by insects for a series of years the insects killed them. He had known the aphis to attack the bole of the beech. Again, if the fungus attacked a beech hedge, in a few days the hedge would be as brown as if the plants had been taken out of the ground and laid aside.

**Sir Robert Christison** said that where insect life was numerous the trees undoubtedly must be affected. But he thought it probable that in some instances insects did not damage trees materially. His friend Lord Curriehill had been much concerned about the points of the foliage of his conifers becoming glued together by the grub of some insects whose heads he could see peeping out; but when the insects became flies the twigs unglued and separated.

**Mr. Kay** maintained that the extreme abundance of insect life was due to want of moisture.

The Chairman said he had observed many large beeches affected by the aphis, which undoubtedly propagated itself with wonderful fecundity, and overrunning the plants destroyed leaves and roots till the tree became dead. He believed that the extreme prevalence of the aphis had been owing to the sunless, cold seasons of the previous two years. These ungenial seasons kept away the ladybird, which lived on the aphis. He hoped that with the return of bright seasons and the ladybird, the plague of insect life would be stayed and the beeches completely recovered.

**Mr. J. McGregor** corroborated Sir Robert Christison as to the glueing together of the young shoots of the larch by the chrysalis of some insect, but when it developed into a fly the shoots separated. This year, however, he had none of that peculiar insect.

The discussion then closed.

It was agreed that the discussion next year should be on the deterioration of the spruce, and on the best method of cubing trees.

It was remitted to the Council to put themselves in communication with the Government with a view to the transference of the collections of wood and cones belonging to the Society, to the Government, on condition of their being taken care of and made available for the members of the Society.

It was agreed that the arboricultural excursion in 1881 should be to the Forres district.

## DINNER AND PRESENTATION TO MR. M'CORQUODALE.

The usual votes of thanks were accorded, and the meeting separated.

The annual dinner of the Society took place in the Albert Hotel, when over fifty gentlemen were present.

Mr. Hutchison, of Carlowrie, occupied the chair, and the croupiers were Mr. McGregor, Ladywell, and Mr. John Methven, Edinburgh. The chairman was supported on the right by the guest of the evening, and Mr. Sadler, curator, Royal Botanic Gardens, and on the left by Dr. Cleghorn, Stravithie, St. Andrew's, and Mr. M'Laren, secretary.

The usual loyal and patriotic toasts, as well as "Prosperity to the Scottish Arboricultural Society," were proposed from the chair.

The **Chairman** then said—Gentlemen, it has been my agreeable duty on two previous occasions since I became a member of this Society to be the medium of conveying to illustrious members (Mr. John Anderson, Perth, and our friend Mr. Sadler)—distinguished by their zeal, and by the interest they have taken in the welfare of the Society—substantial proofs of the regard in which they are held, and of the manner in which their services were appreciated by their fellows; but on the present occasion it has fallen to my lot to again have the honour conferred on me of making a presentation, and this time to one who, while intimately connected with the Society from its very earliest infancy,—having been one of the original members, and one of its staunchest friends throughout its chequered career,—has yet a wider and far more extended range of friends than are merely comprised in the ranks of the Society, and whose efforts, practical and scientific, for the advancement of forestry have a far wider scope and experience, and have acquired through the success attending them, a European, if not a world-wide fame for their author and exponent. (Applause.) I wish it had fallen to one more able than I am to express, in glowing terms, the eulogium which Mr. M'Corquodale is entitled to on this occasion, but to no one could it have been entrusted who more thoroughly appreciated than I do, the personal worth, the talent, the experience and honourable career and high-born integrity of Mr. M'Corquodale. (Applause.) Mr. M'Corquodale completed his fiftieth year as a practical forester in May last, so that we are now celebrating his jubilee. (Applause.) Forty-four of these years have been spent in the management and supervision of the woods and plantations on the extensive estates of the Earl of Mansfield. During that time he has planted and reared many thousands of acres of woodlands with the greatest possible success. Oak, larch, and Scots fir are the varieties which he has most largely cultivated, but all other species and varieties of British timber have found a home under his care on the Scone estates, according to their respective suitabilities for the various localities, and with due regard to their nature and merits. Still it will probably be as the pioneer planter of the newer coniferæ on an extensive scale, as a regular forest crop, that Mr. M'Corquodale will be best handed down to future generations. (Hear, hear.) When he first took charge of the Scone Woods, the taste for planting ornamental conifers was just developing,—fostered by the splendid introduction of Douglas (himself a native of Scone) and others, from the north-western seaboard of America. Of these noble trees, especially *Abies Douglasii*, many thousands have been planted as experimental and permanent forest crops by our friend, Mr. M'Corquodale, to whose skill and forethought they will stand as living monuments for generations yet to come. (Applause.) Regarding Mr. M'Corquodale's skill as a practical forester I require to say very little, as most of you had an apportunity of judging of this for yourselves by the condition of the woods under his care when the Society visited the woods of the Earl of Mansfield. From his extensive experience, Mr. M'Corquodale has frequently been employed as a wood valuator and surveyor, and his opinion upon all matters affecting the laying out and management of woods and plantations is held in the very highest estimation by landlords and others. (Applause.) His connection wiih the Arboricultural Society has been already referred to, but I may notice his frequent valuable contributions to its Transactions, and to his having been Vice-President in 1857, the second year of the Society's existence, and to his having since been repeatedly elected as Vice-President. Mr. M'Corquodale has also been a frequent and valuable contributor to the *Journal of Forestry*, and this month we find him writing on his favourite theme, *Abies Douglasii*. (Applause.) He has also been a contributor to several Continental journals, and in 1868 his opinion was solicited by the Hanoverian Government as to the treatment of larch in Scotland. The training of young foresters has been one of the most important parts of his career. (Applause.) Many young men who now hold important posts abroad can point to him as their preceptor and guide. Indeed, Mr. M'Corquodale may almost say that

"From Greenland's icy mountains
To India's coral strand,"

he has sent young men to sow the seeds of common sense and perseverance first learned and imbibed at Scone. (Applause.) Regarding his personal merits, and the high estimation in which he is held by all his friends, I might say much more were our excellent friend not present; but I must add that no one I know possesses a wider range of sincere and profound admirers on account of his own intrinsic merits and qualities of heart and soul, and that no one I know is more entitled to such loyal admiration for such virtues than is Mr. M'Corquodale. (Applause.) Loved and honoured in his lifetime by every one, may his days be still many and happy amongst his numerous friends. (Applause.) Honoured in his declining years by the testimony of true and real friends to their appreciation of his worth and integrity, may he be long spared to us all as a useful and bright ornament of this Society, as a warm-hearted friend and adviser, and as a landmark and beacon to the young foresters of Scotland to lure them on to the faithful and conscientious discharge of their duty, and to point them the lessons of self-reliance, lofty integrity of character, and stern resolve to do the right. (Applause.) These, I take, have been Mr. M'Corquodale's pole-stars in his career; and when the end does come,—as come it must to us all,—he will have the happy assurance that he

> "Shall sink to rest
> By all his country's wishes blest,
> And Honour comes, a pilgrim grey,
> To bless the dust that wraps his clay;
> And Freedom for a while repair,
> To dwell a weeping hermit there."

(Applause). And, now, Mr. M'Corquodale, in the name of the members and friends of the Scottish Arboricultural Society, I have the honour of asking you to accept this token of their esteem and regard, the intrinsic value of which must not be taken as any gauge or estimate of their profound admiration for your personal worth and character. (Applause.)

The presentation, which had been subscribed to by a very large number of Mr. M'Corquodale's friends and admirers, took the form of a handsome gold watch, and a purse of 100 sovereigns, with a brooch for Mrs. M'Corquodale.

The watch bore the following inscription:—

"Presented, along with a purse of sovereigns, to William M'Corquodale, Scone, by his arboricultural and other friends, as a mark of respect and esteem, on the fiftieth anniversary of his career as a practical forester. Edinburgh, October, 1880."

The brooch is a most magnificent one, and the purse contained about 100 sovereigns.

**MR. M'CORQUODALE**, who was loudly cheered, in returning thanks, said—

Mr. Chairman, Croupiers, and Gentlemen, I beg to return you all my grateful thanks for the kind way in which you have proposed, and the cordial response given to the toast of my health. I shall never forget the honour conferred on me by your kindness in presenting me with these handsome and valuable gifts, on the occasion of having attained my fiftieth year as a forester. In my future wanderings through woods and forests, and everywhere else, this beautiful gold watch will guide me safely as to time, and will ever and anon keep me in grateful remembrance of its kind donors; and we all know that a purse of sovereigns is very acceptable to any one, the world all over. I shall, therefore, appreciate so long as I live this spontaneous mark of your esteem. I owe the Secretary and Treasurer of this testimonial, viz., Mr. Dunn and Mr. Mitchell, in a special manner, a very deep debt of gratitude for their great trouble and labour of love in this affair; and I beg also to offer the members of committee my grateful thanks, and to one and all of the contributors to this testimonial. If I have hitherto done anything for the cause of arboriculture to meet your approval, I do assure you that this token of your kindness will inspire me with fresh vigour to take more interest than ever in the future welfare of the Scottish Arboricultural Society. I know from former experience, before the establishment of this Society, that the situation of forester was a very solitary one. In those days it was seldom indeed that foresters had the opportunity of associating together, or of discussing any subject on forest management. The first impulse that was given to the art of forestry in my days, some thirty years ago, was through the praiseworthy perseverance of Dr. James Brown, on his publishing his book on forest management, and for some years after he was extensively employed in making wood inspections, which also tended very much to the advancement of arboriculture. On the occasion of his appointment as Deputy-Surveyor of Dean Forest, before he left Scotland to enter on the duties of his appointment, he was entertained at dinner by his friends within the Regent Hotel, Waterloo Place, Edinburgh, on the 17th day of February, 1854, now 26 years ago, and I had the honour of presiding at the dinner, and of making the presentation. It was at that dinner that the late Mr. Thomson, Deputy-Surveyor of Chopwell Forest, proposed that an Arboricultural Society should be formed, and I seconded his proposal, which was unanimously agreed to. (Applause.) This is the origin of the Scottish Arboricultural Society. In 1837, prior to Dr. Brown's start at Arniston, now 43 years ago, I turned my attention to the training of forest pupils at Scone, and to the providing of situations for them, which I have continued to do down to this day. I have also been extensively employed in the capacity of wood surveyor to other proprietors, and during that long period I have reported on the existing state and the future management of woods on many estates in Scotland, and also in England. It was through the kind indulgence of my worthy, noble employer, the Earl of Mansfield, that I was privileged to undertake so many inspections. While Dr. Brown was at Arniston, we got very friendly, and visited each other, and a great amount of very interesting correspondence passed between us on arboricultural matters; and I think that all foresters owe a deep debt of gratitude to Dr. Brown for what he has done for arboriculture. (Hear, hear.) The next important step in the right direction was happily the springing into existence of the *Journal of Forestry*, which is so ably conducted by the enterprising firm of Messrs. J. and W. Rider, of London. But after all that has been done and said, there are still essential elements wanting, which must be obtained to enable forest pupils to complete their arboricultural studies in a fitting manner for the duties of the highest forest appointments at home or in India. This Society should never rest satisfied until these are obtained, viz., a Charter; a Board for the examination, and granting certificates of merit to foresters; and a Forest School. If these were secured, I would then consider the Scottish Arboricultural Society in full working order, and then forest pupils might be efficiently trained at home. I hold that with all our intelligence and vigour, the state of our arboricultural education is defective, when we cannot train our own subjects in Britain efficiently for forest appointments in India, but are obliged to send them to Germany or France for instruction. With these remarks, I beg to thank you all, gentlemen, for the kind reception you have given me here to-night; and if spared in health and strength, I hope to be able to attend a few more of your annual meetings. Since the commencement of this Society, I have been only once absent from the annual meetings; and if a prize is offered for regular attendance, I think I may stand a good chance of getting it. (Laughter and applause.)

Mr. Mitchell said that he should like very much if Mr. Dunn would read a few of the expressions of goodwill towards Mr. M'Corquodale, which both he (Mr. Mitchell) and Mr. Dunn had received.

Mr. Dunn said that he had received twenty or thirty letters from all parts of the country, testifying to the esteem in which Mr. M'Corquodale was held, and he read a few extracts.

The Chairman afterwards proposed "The health of the Noble President, the Marquis of Lothian;" Mr. Robertson, Panmure, proposed "The Proprietors of Scotland," coupled with the Chairman; and Mr. McGregor, Ladywell, proposed "The Learned Societies of Edinburgh," coupled with Dr. Cleghorn. The Chairman proposed "The Press," coupled with Mr. Rider, of the *Journal of Forestry*, and the other toasts included "The Successful Competitors," "The Judges," "The Nurserymen," "The Secretary and Treasurer," "The Chairman," and "The Croupiers."

## EXCURSION TO DALMENY AND HOPETOUN WOODS.

It had been originally arranged that the annual autumn excursion of the members of the Society should be made to the woods of Blair-Adam, the demesne of their late President, the Right Hon. W. P. Adam, M.P., but as that gentleman had lately been appointed to the Governorship of the Presidency of Madras, and was in the midst of preparations for his departure to India, it was thought proper to defer the visit to the plantations in the neighbourhood of the classic Loch Leven. On the invitation of the Earl of Hopetoun, it was thereupon agreed to spend a day in the exploration of the charms of Hopetoun policies, and a more interesting or agreeable "outing" could not have been selected. One of the most princely residences of the Scottish nobility, and from its style of architecture designated the Scottish Versailles, Hopetoun House is surrounded by scenery of the most magnificent character, and pleasure-grounds, gardens, and woods, attractive in the highest degrees to the arboriculturist. The grounds were, it is said, laid out under the direction of the celebrated English landscape gardener, Switzer, and were among the last of the considerable seats arranged and planted in the ancient style in Scotland. But what renders the policies of Hopetoun peculiarly interesting to lovers of arboriculture is that here were planted some of the earliest Himalayan coniferæ introduced into Great Britain, more especially the Deodar and the Marinda. The seeds were sent from India by Dr. Govan to the Earl of Hopetoun about the year 1834, and then planted. The gentleman who brought them from India—Dr. Watson—gave, when he came home, a few seeds to a relative who was tenant of Liberton Mains farm, east of Edinburgh, and that enterprising farmer sowed the seeds in the small avenue leading to the handsome farmhouse. At least two of the Deodars survive and have formed handsome specimens, though never in receipt of any particular care, and have formed a hitherto unsolved puzzle as to how such tall and healthy trees of such a new importation came to be growing in a farmer's front plot.

The morning of 6th October was threatening, and fears were entertained that the weather would not be at all favourable to a stroll through woodlands, but by the early forenoon the sky cleared and the day was thereafter all that could have been wished for the excursion. Hopetoun lies about a dozen miles west of Edinburgh, and as the highway thereto has been described as one of the finest drives in Europe, it was determined to make the journey in good old-fashioned style. Accordingly, at half-past nine as near as possible, fifty members of the Society started from the west end of the modern Athens in coach, waggonette, and carriage. Crossing the Dean Bridge, with its splendid vista of the gorge of the water of Leith, passing notice is taken of the admirable planting which has been carried on on the western banks, and which, in a few years, promise to make this one of the most umbrageous, as it is one of the most picturesque spots of the new town of Edinburgh. Getting fairly clear of the fine new palatial terraces which are rising between the Dean and Stewart's many-turreted hospital, we command a grand panorama of the Firth of Forth, with in the middle distance the lovely slopes of Comely Bank crested by the palladian Fettes College. Thereafter the confused heaps of Craigleith quarry are seen, and arboriculturists are reminded that in this immense excavation, which has furnished the fine freestone blocks with which New Edinburgh has been built, were discovered numerous enormous fossil trees *in situ*, the remains of some primeval forest of *Araucaria excelsa*. One member of the party makes the interesting observation that it is curious to observe being introduced into Scotland from the southern hemisphere species of trees which, in the long ago past, were the indigenous forest trees of these latitudes. The village of Blackhall is soon left behind, and with the beautifully wooded Costorphine Hill on our left front, glowing with the richest autumn tints, we catch fleeting glimpses of Craigcrook Castle, the whilom residence of Lord Jeffrey, the great Edinburgh reviewer; of Lauriston Castle, once the patrimony of John Law, the financier, gambler, and originator of the Mississippi scheme and the Bank of France. The district is one of the best wooded in the lowlands of Scotland, and indeed it never can have been wholly denuded of timber since the days when the ancient forest stretched unbroken from Clyde to Forth. Cramond Regis, the site of which we pass on the right, and near the modern mansion of Barnton House, was a hunting seat of James V. Cramond Brig, to which we have now come, affords a lovely prospect of a charmingly wooded ravine on the one hand, and of an old-fashioned village with its red-tiled houses glowing out of the shadows of venerable trees. There also is the narrow high-peaked old brig of Cramond, the scene of the gallant King James's encounter with the gipsies, and his rescue by John Howieson, who little thought that "the gudeman o' Ballengeich" was his sovereign until James discovered himself at Holyrood. "Jock" was for his timely service endowed with the lands he tilled under the condition of doing suit and service to the crown of Scotland by presenting a basin of water and a towel to the sovereign whenever called upon. When George IV. visited Scotland in 1822, Mr. Wm. Howieson Crawford, a descendant of the redoubtable John, performed the ceremony of presenting basin and towel to His Majesty at the great public banquet in Edinburgh. In some of the belts of plantations which border the highway up to this point, attention was directed to the evils of over-thinning, for the trees were palpably stunted in growth or in cases killed down on being deprived too suddenly of the close shelter previously enjoyed.

A section of the party in advance of the others took advantage of the spare time to make a run through the Dalmeny policies. With the present Earl of Rosebery, as with his predecessor, the desire has been to retain the domain in as near as possible a state of nature; and consequently there is a constant succession of wild glades, charming openings altogether devoid of signs of art, yet exhibiting the most glorious scenes of frith, coast line, and distant mountain. We note what has been commented upon by a local historian, that the Dalmeny beeches and limes are stunted in altitude, but are remarkable for their wide-spreading character. There are some very fine oaks, chestnuts, and ashes in the park, and several pairs of notable "marriage trees"—the planting of two trees close together on a marriage in the family having apparently prevailed at Dalmeny for several generations. Just approaching the mansion-house—an imposing building in castellated Gothic—is the avenue of oaks which were planted by the present Prime Minister as an amusement during his residence at Dalmeny, when he was conducting his now famous electoral campaign which placed him at the head of the Government. The drive now sweeps round to the right, and passing some veteran trees shorn of their splendour by the Tay Bridge gale, we come to the ancient castle of Barnbougle, the stronghold of the Templars, the Mowbrays and the Primroses, and now being restored and enlarged by Lord Rosebery. The castle is built on a peak of land projecting into the Forth, and the stone terrace which surrounds the venerable feudal stronghold commands a varied panorama of wood and water, comprehending the wide expanse of the Forth as far as the Bass Rock, the city of Edinburgh in the distance, and in the right foreground the park and wooded bay with the village of Langreen, whose red and white cottages peeping amongst the greenery give a living interest to the scene. The peak on which the castle stands is known as the Hound Point, from a legend which sets forth that whenever a lord of Barnbougle approaches his latter end the spectre of a man and a hound appear, and the man winds a long piercing note on a bugle.

> "And ever when Barnbougle's lords
> Are parting this scene below,
> Come hound and ghost to that haunted coast
> And death-notes winding slow."

The park through which we are now wending our way under the leafy canopy of fine well-kept avenues, was the scene of the last single combats or trials by wager of battle on record in Scotland. The combat took place on March 15th, 1595, under licence of the king, who granted permission as an exercise of feudal prerogative, and also as a means of preventing clan fights. Birrel thus succinctly tells the story of this strange manner of trial. "Adame Bruntfield challengit James Carmichaell for murdering of his vmgle brother, Stephen Bruntfield, captain of Tantallonne. The said Adame purchaset ane license of his Majesty, and faucht the said James in Barnbowgall hinkis, before fywe thowsand gentillmen: and the said Adame being bot ane young mane and of a mein statur, slew the said James Carmichell, he being als abill a lyik man as wes leieveing."

Turning in the direction of Queensferry we pass close to Harold's Cairn, surrounded by stately forest trees of magnificent proportions. This cairn is 500 ft. in circumference, and is composed of boulders of granite, whinstone, quartz, iron-stone, limestone, &c. Where these boulders came from is a mystery of the past, and the tradition of the cairn connects it with the landing in the neighbourhood of some of Harold's family when they fled from England, after the battle of Hastings. A farm in the neighbourhood is still named Echline, which is Atheling Scotticised, and it is undoubted that Edgar Atheling and his mother and two sisters—the saintly Margaret and devout Christina—fleeing from the wrath of the Norman conqueror, sought and found a refuge here and at Dunfermline with Malcolm Caen-mohr. We emerge on to the highway at a rocky eminence crowned with a clump of fine oaks and conifers, marked by a cross as the resting place for pilgrims from Holyrood to Dunfermline; and presently there is unfolded what the celebrated Naismyth, the landscape painter, alleged to be the finest view in the world. Admitting that these are the words of exaggeration, yet we must confess after a survey of the most renowned spots of Europe, we have never seen a fairer or more picturesque. The ancient burgh of Queensferry nestles at our feet with its quaint gabled roofs and Dutch-looking tower, and its primitive piers where yet may be seen the channels worn by the chains which drew up Agricola's Roman galleys. In the narrow channel below St. Margaret's Hope, now sheltering scores of vessels from the easterly gale which blew last night, is the island of Inchgarvie—the centre resting-place of the gigantic suspension bridge which is to span the Forth at this point. Beyond are the bluff headland of North Queensferry and the long wooded reaches and cosy bays till the silver links of the estuary disappear in the distance.

> "But northward far, with purer blaze,
> On Ochil mountains fell the rays,
> And as each heathy top they kissed
> It gleamed a purple amethyst.
> Yonder the shores of Fife you saw;
> Here, Dundas Hill and Falkland law,
> And broad between them roll'd

> The gallant Frith the eye might note,
> Whose islands on its bosom float,
> Like emeralds chased in gold."

The steep hill down which we are compelled to creep to the village of Queensferry is sandstone, and in the strata exposed are found splendid fossil specimens of *Stigmaria ficoides*. Its huge dome-shaped root-stock and stigmated stems and branches occur in much profusion, freely weathered out on the surface of the hard compact sandstone, and easily detached, sometimes in pieces 7 ft. long. After driving through the crooked and narrow street of the old burgh named after Queen Margaret's favourite route from Dunfermline to Holyrood, we skirt the shores of the Forth till the hamlet of Society is reached—the fine freestone quarry being passed from which were excavated the blocks used in the building of the quay and fortifications of Dunkirk. From Society we turn inland a few hundred yards, then sweep round into a beech avenue which conducts us on to the plateau, in the centre of which the palladian structure of Hopetoun stands. The view from this point is remarkably fine, and has been thus described by Mr. James Smith, who was gardener at Hopetoun forty years ago:—"From a bend in the coast the house is so placed as to possess an almost central prospect of the Forth, which stretches away as far as the eye can reach, and forms a noble prospect, indented on either side by promontories, interspersed with little islands, and bounded on the extreme horizon by the German Ocean at about the distance of forty or fifty miles. The elevated and finely wooded grounds of Dalmeny Park on one side and the bare and rugged hill of North Queensferry on the other, both projecting into the sea and narrowing the passage, are conspicuous objects. The prospect on the west is less extensive, being limited by the masses of trees in the pleasure-ground through which only a few vistas are cut to remarkable objects, such as Blackness Castle, one of the forts upheld in conformity with the articles of Union, and a faded memorial of Scottish national independence."

When we are informed that this "National fortress" is now used as a powder magazine, and that its garrison consists of a man and a boy, we have some excuse for exclaiming, Ichabod!

"Along the brow of the long and irregular plateau on which the house stands there is a terrace walk, from which are seen views of surpassing beauty. The Forth, apparently cut off from the east by intervening objects, partakes of the lake character, and is said to resemble some of the lakes of Switzerland. Immediately opposite, the contour of the hills of Fife is rather tame, but it rises into more magnificence as it retires from the eye. Farther west, the Ochil Hills display those finely outlined eminences which characterize the transition series of rocks. They are seen with the sea as a base line and hence appear to be of greater elevation than they actually are. Beyond them, and still further west, tower the rugged summits of the Grampians, among which, Ben Ledi, Ben Venu, and Ben Lomond are proudly conspicuous. The ground on the south side of the Forth is less elevated, though there are occasional risings. The intermediate basin is occupied by an apparent lake, about four miles broad, and of great length. Over this sheet of water the summer sunsets are of uncommon splendour."

When the whole of the excursion party had arrived they were taken in charge by Mr. J. McLaren, head forester on the estate, and a move was at once made for the broad terrace overlooking the sparkling waters of the Firth. From the battery attention was directed to the panoramic outlook which commanded, on the further shores of the Firth, the woods of

Broomhall, the seat of the Earl of Elgin, and the square tower of Rosyth Castle, where Queen Mary fled after her escape from Loch Leven, and also alleged to have been the birthplace of Cromwell's mother. Taking a narrow pathway leading shorewards, we reach the rustic picnic house built by Mr. McLaren and his men, from wood grown on the estate. The house consists of a main front with wings, and the interior is divided into a kitchen and dining-room. The walls are lined with stained and polished wood in geometric pattern, and among the forty varieties—all grown in the immediate neighbourhood—are tulip, elm, ash, plane, horse-chestnut, beech, oak, walnut, yew, Scotch fir, larch, Norway maple, pear, red cedar, &c. A bank richly clothed with ferns, rhododendrons, and bays overlooks a stone platform with handsome balustrades, which commands a lovely sea view as it is washed by the waves at high water. Returning to what are known as the pleasure-grounds, the arboriculturists are delighted by a stroll through glades of some of the finest timber in the south of Scotland. Measuring lines and angles were produced, and plenty of work was found during the next few hours for the enthusiastic statisticians of the party. A general remark may be made regarding some of the more prominent trees. The grounds are peculiarly rich in hollies, which attain large proportions. Many are over 6 ft. in girth at 5 ft. from the ground, but for the most part they are shorn of the glory of their glaucus heads. The severe frost of 1860-61 cut them down almost without exception. All the branches were pruned off, and now they have started from the boles promising, to make fine pollards. Another characteristic of these woods is the number of grand old yews, the venerable cedars, the spreading chestnuts, and the tall oaks. The first tree to be embraced by the tape was a Spanish chestnut which measured 9 ft. 4 in. in girth at 4 ft. from the ground. The peculiarity of this tree was its beautiful plain stem. Another, also somewhat smooth, but showing the sprial character near the "conoidale base," was 13 ft. in circumference at 5 ft. from the ground, and 85 ft. in height. Several of the yews were measured—admiration being expressed at the picturesque appearance of the stems, which were something like the clustered shafts of a Gothic cathedral. One was 8 ft. 1 in. in girth at 5 ft. from the ground, and 45 ft. high; another was 8 ft. 3 in. at 5 ft. from the earth, with a bole of 18 ft., and a total height of 40 ft. Further along the terrace and nearer the lawn was a Spanish chestnut 16 ft. 4 in. 5 ft. up. When young it had evidently been drawn up from overcrowding, as there was scarcely a twist in the bole, which reached 20 ft. before a branch sprung from the trunk. The height of the bole was 30 ft., and the total height of the tree was 56½ ft. There were in the same neighbourhood several magnificent oaks whose height was noteworthy. No. 1 measured 10 ft. 8 in. 5 ft. up, had a bole of 56 ft.; No. 2 was 11 ft. 8 in. in girth at 5 ft. from the earth, and had a curious sort of buttress at its base; No. 3 had a straight stem 93 ft. in height, and girthed 8 ft. 8 in. at 5 ft. up. Now we come upon a beech 11 ft. 7 in. at 5 ft. from the ground, with a bole of 60 ft., and a height to the topmost branch of 112½ ft. Turning to the right the sea-view walk was pursued to afford the visitors an opportunity of enjoying the glorious panorama of the Forth. This walk is protected on its precipitous side by a yew hedge so thick and admirably trimmed that one could walk comfortably upon it for several hundred yards. The shifting view from this delightful terrace walk was enchanting. The dark and detached masses of Blackness Castle projecting far into the bosom of the Forth, the bright and variegated colours of the low Fife hills, the density of the dark green woods, and the bold magnificence of the bluffs, with the whitewashed villages nestling on the sheltered beach, or lining the recesses of the creeks, combined with the moving sails of the vessels, or trailing smoke of the steamers, to give life, expression, and feeling to the exquisite picture. At the end of the terrace walk we turn up the Glen of Abercorn, along what is known as Lord Hope's walk.

On the further side of the glen, and separated from that on which we stand by a brawling stream, the banks are clothed with a magnificent plantation of American arbor vitæs, mixed with bays, Portugal laurels of great luxuriance, yews, alders, &c. This glen indeed is an ancient arm of the sea, and the old sea wall can still be traced for a considerable distance. A slight detour from the walk takes us up an abrupt knoll crowned by a group of fine cedars. This is the site of the old monastery of Abercorn, mentioned by the venerable Bede, and of Abercorn Castle, the scene of an historic incident in the annals of Scotland. It was the seat of the gallant Sir John the Grahame, the friend of Wallace, who fell at Falkirk in 1298, and, with the hereditary sheriffship of Linlithgowshire it passed subsequently into the hands of the Douglases, the Mures, the Lindsays, the Setons, and the Hopes. It was under the Douglas family that Abercorn sustained the memorable siege in which it was dismantled by the forces of James II. in 1455. Douglas had taken the king's nephew prisoner, and on the release of the stripling being demanded, the youth was beheaded, and the headless trunk sent to the king. James collected his forces and laid siege to Abercorn Castle while Douglas was absent raising his followers. With 70,000 men Douglas then advanced to raise the siege of his stronghold, but the Earl of Hamilton with his men went over to the king's side, and this was but the signal for the defection of nearly the whole of Douglas's army, whereupon the king went in pursuit, but failed to capture his haughty subject, who found refuge with Donald, Lord of the Isles. The king then returned to Abercorn Castle, took it by storm, with the loss of "manie of his folkes and sundrie richt evil woundit." The castle was dismantled and never after restored. It may be mentioned that the present Earl of Hopetoun is a descendant of Donald, Lord of the Isles, with whom the Douglas sought shelter, his grandmother by his father's side being one of the last of the Macdonalds of the Isles. Leaving the scene of such old world tragedies, the party were taken to see one of many similar arboriculture curiosities. This is a marinda grafted on a Norway spruce. The Mr. Smith who has been referred to as gardener here forty years ago, had a notion of grafting the newer coniferæ upon a hardy stock, and this is one of many to be found scattered through the policies. The tree is 46 ft. high, with the marinda foliage and habit very characteristic, Dr. Cleghorn, whose long experience in India gave him a title to speak with authority, stating that in the Himalayas he had never seen a finer specimen. Examination closer shows the graft at about 4 ft. 6 in. from the ground, and here the girth is 4 ft. The different natures of the wood of the parent and the graft are conspicuous, the graft appears like a swollen ring, and, curiously enough, the lowest branches of the tree come from the parent, thus presenting a tree with its lowest feathery boughs and leaves quite different from all the others. This interesting tree was minutely examined and commented upon by the company, who thereafter bent their steps towards the deer park, passing a fine sycamore growing below the old sea margin. It measured 10 ft. 4 in. 5 ft. up, and had a bole, clean and straight, of fully 40 ft. Passing along the grand beech avenue, with its exquisite vista, on the west side of the house we come to the south lawn, and here we note two memorial trees—*Cedrus Atlantica*—planted several years ago by the King of Denmark and the Princess of Wales. Both are thriving beautifully, more especially that planted by the

Danish King. From an arboricultural point of view what was still more interesting was the pair of ancient cedars of Lebanon. One is almost gone, with few branches, in the clefts of which are growing self-sown hollies and sycamores. It girths over 24 ft. The other is 75 ft. in height, and measures 22½ ft. in circumference at 5 ft. from the ground. It is said that both were planted in 1748, but none of the arboriculturists present believed that these veterans could be so young. It was noticed that the cedars—not only this pair, but all over the estate—were of a more glaucus character in their foliage than is generally observed, more like *atlantica* than the generally accepted cedar of Lebanon. Some of the party were inclined to accept this as a proof of Sir Joseph Hooker's theory, that all the cedars could be traced to the Lebanon variety. A few yards from these giants, and growing on the bank of a small burn, is another cedar of Lebanon, 14 ft. 3 in. in girth. It has a peculiarly top-heavy appearance, as at no great altitude the tree spreads out with branches larger than ordinary trees. Hollies were also growing in the clefts of the bole of this tree, and it would seem as if there were some affinity between the cedar and the holly. A short distance away is a grand specimen of the *Liriodendron tulipifera*, or tulip tree of America It is 7 ft. 6 in. in girth at 5 ft. from the ground, and towers to a height of 84 ft. Passing many magnificent beeches we wend our way to the flower-garden, which occupies a charming site in a little natural valley on the south-east side of the house. Here are dispersed some splendid specimens of *marinda*, Scots fir, *araucarias*, *deodar*, cedar of Lebanon, *Douglasii cephalonica*, while a hemlock Spruce—*Abies Canadensis*—girthed 6 ft. 6 in. 5 ft. up, and stood 50 ft. high. Some ardent arboriculturists drew attention to a case of "beheading without judgment." It was the destruction of the symmetry of a fine fern-leaved beech, the only specimen of this tree in the grounds, in order to save the shade from few feet of a glass-house containing geraniums!

The party then took their way to the ball-room in Hopetoun House, where luncheon was served—Mr. John Ord Mackenzie, of Dolphinton being in the chair and Mr. Robert Hutchison, of Carlowrie, croupier. After luncheon the health of Lord Hopetoun was duly pledged, as was also that of the Dowager Lady Hopetoun and Mr. M'Laren, senr., the former for their kindness in permitting the members of the Society to inspect the beautiful woods, and the latter for the admirable manner in which he had conducted the visitors. Thereafter, the company made their way to the pinetum, and *en route* stopped to admire several fine groups of silver firs, and a cluster of oaks 122 ft. high, with a clean straight bole of 50 feet. Near the reservoir was a plantation in which Mr. M'Laren's method of pruning and foreshortening could be studied to advantage. Instead of cutting the branches close to the bole, which is frequently injurious to the main stem, and causes the timber to be knotty, Mr. M'Laren foreshortens the branches, taking care to leave a side shoot growing to carry up the sap. The effect is to form a nicely balanced head while the timber of the stem is duly developed.

The pinetum (of the contents of which, through the kindness of Mr. M'Laren, we are enabled to give a complete list), said to be the finest in Scotland, was begun some twenty-five years ago on a piece of waste land adjoining the home nursery. The arrangement is admirable and the health and vigour of the trees remarkable. It embraces numerous specimens of every conifer introduced into this country, and days might be spent in a detailed study of the progress of the different varieties. In the centre is a fern bower, in which fossil araucarias are artistically employed to aid the rustic beauty of the secluded wild. A lake also enhances the beauty of the pinetum. now deservedly the favourite walk of the noble owners. From the pinetum the party were conducted to see a young mixed plantation. The site was a moor, and in one of the rides is still standing the stone where "the prefect of the market" sat and settled all disputes that occurred during the cattle fairs held here in ancient times. Among the trees growing in great luxuriance are the Corsican pine, the Norway maple, the black Italian poplar, *populus nigra*, the larch, spruce, silver fir, *Pinus cembra*, the Austrian pine, black American spruce, Scots fir, Turkey and British oaks, *Pinus Menziesii*, *P. Nordmanniana*, &c.; and the whole plantation is notable for good management, its pruning and cleaning. Not a dead tree could be seen, and scarcely a dead limb. In retracing our steps we are led into Parkhead Glen and shown a group of larches of gigantic proportions. One was measured and found to be 9 ft. in girth at 5 ft. from the ground, and 130 ft. high. It was calculated that this mammoth contained 200 cubic feet of timber, and Mr. M'Laren stated that out of the same glen he had cut larches containing 150 cubic ft. of timber.

Shortly after the carriages and waggonettes were met with, and the party returned to Edinburgh *viâ* Dundas, and Dalmeny village, highly delighted with their pleasant and profitable excursion.

### LIST OF CONIFERS, &c., IN THE HOPETOUN PINETUM.

| | Height. | Girth. | |
|---|---|---|---|
| | feet. | ft. | in. |
| *Abies Albertiana* | 34 | 1 | 10 |
| ,, *Canadensis* | 11 | 1 | 1 |
| ,, *Clanbrasiliana* | 3 | | |
| ,, *Douglasii* | 36 | 2 | 6 |
| ,, *Hookerii* | 5 | | |
| ,, *Menziesii* | 38 | 3 | 0 |
| ,, *monstrosa* | 5½ | | |
| ,, *morinda* | 24 | 2 | 2 |
| ,, *nigra* | 17 | 1 | 2 |
| ,, *orientalis* | 26 | 1 | 9 |
| ,, *polita* | 1½ | | |
| ,, *Sabiniana* | 8 | | |
| ,, *Whitmanniana* | 16 | 1 | 1 |
| *Araucaria imbricata* | 27 | 2 | 5 |
| *Biota orientalis* | 17 | | |
| *Cedrus Atlantica* | 31 | 2 | 9 |
| ,, *deodara* | 39 | 2 | 7 |
| ,, ,, *variegata* | 16 | 1 | 4 |
| ,, *Libani* | 8 | 2 | 5 |
| *Cephalotaxus Fortunii* | 3 | | |
| *Cryptomeria Japonica* | 26 | 1 | 8 |
| *Cupressus Lambertiana* | 25 | | |
| ,, *Lawsoniana* | 16 | | |
| ,, *macrocarpa* | 30 | | |
| ,, *torulosa* | 20 | | |
| *Juniperus Chinensis* | 16 | | |
| ,, *Virginiana* | 17 | | |
| *Picea amabilis* | 12 | 1 | 8 |
| ,, *bracteata* | 5 | 0 | 5 |
| ,, *Cephalonica* | 26 | 2 | 10 |
| ,, *grandis* | 24½ | 1 | 4 |
| ,, *magnifica* | 6 | 0 | 6 |
| ,, *nobilis* | 31 | 2 | 8 |
| ,, ,, *glauca* | 1½ | | |
| ,, *Nordmanniana* | 27 | 2 | 0 |
| ,, *Parsonii* | 16 | 1 | 4 |
| ,, *pindrow* | 30 | 2 | 3 |
| *Picea pinsapo* | 22½ | 2 | 1 |
| ,, *Webbiana* | 29 | 2 | 1 |
| *Pinus Austriaca* | 30 | 3 | 2 |
| ,, *Beardsleyii* | 20 | 1 | 9 |
| ,, *Benthamiana* | 37 | 2 | 6 |
| ,, *cembra* | 23 | 1 | 10 |
| ,, *Coulterii* | 13 | 1 | 0 |
| ,, *excelsa* | 26 | 2 | 6 |
| ,, *Hamiltonia* | 21 | 2 | 9 |
| ,, *Jeffreyii* | 13 | 1 | 1 |
| ,, *Lambertiana* | 25 | 1 | 8 |
| ,, *laricio* | 37 | 3 | 6 |
| ,, *monticola* | 39 | 2 | 9 |
| ,, *parviflora* | 12 | 1 | 0 |
| ,, *ponderosa* | 20 | 2 | 1 |
| ,, *Pyrenaica* | 24 | 1 | 4 |
| ,, *strobus* | 33 | 2 | 8 |
| *Quercus pannonica* | 15 | 1 | 5 |
| *Retinospora ericoides* | 6 | | |
| ,, *nana aurea* | 5½ | | |
| ,, *obtusa* | 4 | | |
| ,, *plumosa aurea* | 3½ | | |
| *Taxodium sempervirens* | 34 | 3 | 3 |
| *Taxus adpressa* | 10 | | |
| *Thuja Lobbii* | 14 | | |
| ,, *occidentalis* | 16 | | |
| ,, *pendula* | 5 | | |
| ,, *robusta* | 14 | | |
| *Thujopsis borealis* | 30 | 2 | 8 |
| ,, *dolobrata* | 5½ | | |
| *Wellingtonia gigantea* | 33 | 4 | 4 |
| Purple Beech | 16 | | |
| Purple-leaved Elm | 16 | 1 | 10 |
| ,, Oak | 5 | | |
| Snake-barked Maple | 14 | 1 | 4 |
| Thorn Acacia | 16 | 1 | 6 |
| Tulip-tree | 8 | 1 | 6 |

3 *Pinus Pyrenaica* (grafted on Scotch firs), from 3 to 4 feet in height, growing freely.

## ENGLAND.

PLANTING will still be the forester's principal work, and no opportunity should be lost of getting this well forward. Evergreens having already been disposed of, hardwoods should, if possible, be got into position by the middle of the month. It may be necessary to stake and tie the larger trees which were removed early.

Drain, by means of good open ditches, all wet land intended for early spring planting. Coppice sales should be held as early as possible in the month, in order to enable the purchasers to effect an early clearance. The conditions of sale should fix definite times for cutting from the stub and clearing the falls. During the felling the stools should be carefully rounded off, so that no water will lodge. Upon all land which is never submerged the cutting should be low. This will ensure a stronger and straighter growth. Too large or too blunt an axe will disturb the stool, and sometimes sever the smaller roots.

Clearance roads should at once be laid out and lined with brush-fagots, and to these purchasers should be restricted. Nothing injures the future growth so much as the trampling of horses and the passage of wheels over the fresh-cut stools.

Tree seeds of all kinds should still be gathered as they become ripe, and either sown or carefully stored, according to their requirements. Lay up ash keys in light sandy earth about ten inches thick, and turn them over occasionally throughout the winter. Gather alder cones in dry weather, turn the heap frequently, and the seeds will separate. If any remain encased, thresh and sift what are left, and then lay them up till spring. Beech-masts should be collected as soon as they fall, for the capsules soon open and scatter the seeds. Lay them up about six inches in thickness, and continue to turn until they are dry, when they may be thickly stored till spring. But such seeds should not be put into bags. Holly berries may be put at once into the rot-heap, where they must be kept for a year, and even then many of them will not germinate for another season. Hornbeam seeds will now be ripe, and as they are easily separated from their outer covering, they may be sown at once. Most of these will rise the first year.

Acorns, walnuts, hazelnuts, Spanish and horse chestnuts may still be planted. Where the land is wet or inclined to be heavy, the plan of placing the seeds at regular distances upon the surface of the beds and covering them with two or three inches of fine soil shovelled from the intermediate alleys, is the best and safest method of sowing.

Take layers from stools, placing the stronger ones in the woodlands and the smaller in the nursery. Trench to a good depth all vacant plots required for spring planting, and wheel or cart on manures and composts in suitable weather.

Cut osiers and plant up fresh beds. Grub, or lay and plash old hawthorn hedges, and plant up new ones. By the end of the month fell the birch, beech, sweet chestnut, and alder, and strip off the bark where such is valueless for tanning purposes.

By the end of this month or early in December the seeds of many of the conifers may be collected. These require attention in keeping. Cuttings of various kinds may still be made, but their success will depend greatly upon the mildness of the winter.

Every attention should now be given to watercourses and culverts, so as to keep the young plantations in as dry a state as possible throughout the winter. Where there is danger from hares and rabbits, the washing of young trees should not be longer delayed.

A. J. BURROWS.

*Pluckley, Kent.*

## SCOTLAND.

HAVE all cones of the genus *Picea* gathered at once. From the erect habit of the cone the seed is apt to get damaged by rain percolating through the bracts if allowed to stand into winter.

Dig ground for spring seed-beds, also sow beech and chestnut.

Planting may be done on dry sheltered ground. Larch three years old, twice transplanted, firs and pines four years old, once or twice transplanted, are good sizes to use either for nurses to hardwood or for a permanent crop. In taking precautions against rabbits the best method is to dig all the holes for a good distance round the plantation. I know nothing that puts them so effectually down as this plan.

The regular winter work will be fairly started now—thinning and felling timber. The demand for small thinnings is very slack, and, where not absolutely necessary, thinning should either be postponed or done sparingly. For full-grown hardwood of best quality there is still a fair price to be obtained. W. W. R.

## WALES.

Wherever the ground has been properly fenced and prepared, the planting of forest trees of all kinds should be proceeded with. All ground requiring draining should be operated on as soon as possible, so as to be ready for planting in the spring. During slight frosts in the morning the workmen may be employed in draining or making pits for hardwood trees, so as to be near at hand to commence planting as the frost goes off. If rabbits or ground game are troublesome, young plantations should be protected with wire netting three feet high, and sunk at least six inches into the ground.

Where convenient the general thinning of plantations (hardwood and others) should now be proceeded with; outlying plantations may be thinned first, leaving the home plantations until the last, by which time they will have been shot through. Cut down and remove hedgerow trees during dry and favourable weather, or during frost when the ground is hard.

Where not already done finish up the switching of hedges, and continue the planting of young ones. Look round and put all fences and tree guards in good repair.

Where trees and shrubs have been transplanted this season, see that they have not been blown or swayed by the wind; when such is the case, have them put upright, and the roots well covered, so that they may not be injured by frost, &c.

Fill up all vacant ground in the nursery, and in the removal of plants turn the ground well up, so as to receive the winter's frost. Sweep up leaves, and roll grass lawns and walks.

*Kinmel Park.* Lewis Bayne.

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## IRELAND.

Where large breadths are to be planted foresters ought now to be busy. The planting of forest trees is a most important operation, and unless performed in a proper manner entails a considerable loss, as nothing can afterwards be done to remedy any mistake committed. In this respect forestry differs from farming. When raising the plant in the nursery every care should be taken not to cause root fracture. A mutilation of the rooty fibre is frequently the cause of much disappointment and failure in the work. The plants ought to be well raised with the spade so as to come out freely. They ought to be sized as much as possible before being tied into bundles, and kept separate. Attending to this will the better admit of a correct distribution of the plants. During the whole operation of planting the greatest attention ought to be taken to prevent the roots getting dry or in any way exposed to either sun or wind. On the ground intended for a plantation select a dry and convenient spot, where the plant can be "heeled" in trenches, from which they are taken as required. The spade men ought to be arranged into a squad under the charge of a foreman, whose duty is to see the work properly done. Unless method is studiously enforced an even distribution of plants can scarcely be expected. With a well-equipped squad and ordinarily good weather a large extent of ground should be covered before the end of the month.

When not engaged planting, the nursery should be dug and cleaned. Dung-forks are very useful for digging in the nursery, and are better adapted for bringing to the surface all weeds than the common spade.

Clip hedges; layer and repair old thorn fences; dig and prepare new line fences; also prepare for filling up gaps in hedges by digging and manuring. Gather leaves and road scrapings into the compost heap, and begin ground work of all kinds.

D. Sym Scott.

*Ballinacourte, Tipperary.*

## VITALITY OF THE SEEDS OF PINUS CONTORTA.

Some of the Pines, among others the one named above, hold the unopened cones of many successive years, so that seeds varying in age from one to perhaps ten years may be collected from one tree at the same time. There are specimens in Kew Museum illustrating this curious phenomenon. How long these seeds retain their vitality, whether those six or eight years old are as good as those one year old, whether the older ones lose their germinative power quicker than the younger after removal from the parent tree, are questions which cannot be satisfactorily answered without further investigation. Mr. Sargent, of the Harvard Arboretum, communicates the results of one imperfect experiment with the seeds of *Pinus contorta* to Coulter's *Botanical Gazette*. In 1874, Dr. Engelmann collected in Colorado a branch of this species, to which were still persisting the closed cones which had ripened in the years 1865 to 1873 inclusive. In the spring of last year the branch was sent to Harvard Arboretum, in order that the vitality of the seed might be tested. All the seeds yielded by the cones were planted on May 17, 1879, those of each year in a separate pot. They all received the same treatment, and the final examination was made on December 13, 1879. The following is the result:—

1865—Eighteen seeds from three cones, none germinated.
1866—No seeds from the only cone.
1867—No cone for this year.
1868—Twenty-four seeds from two cones, none germinated.
1869—Twenty-four seeds from two cones, four germinated.
1870—Forty-five seeds from two cones, four germinated.
1871—Six seeds from one cone, two germinated.
1872—Nineteen seeds from two cones, five germinated.
1873—Nine seeds from one cone, none germinated.

This experiment does not prove much beyond the fact that seed ten years old germinated. Possibly some of the seeds were never perfect, and proably some of them would germinate after lying some time longer in the ground.

# THE HOME FARM.

## OPERATIONS FOR NOVEMBER.

THE work of the present month will depend very much upon the state of the weather and the progress which has already been made.

*Arable land* may still be scarified, cleaned, and ploughed, as a preparation for peas and beans, carrots, potatoes, wurzels, swedes and turnips. Where chalking, liming, or marling is practised, these may be carted on the land as opportunities offer. Upon the heavier soils sowing should now be finished, though upon lighter lands the work may be carried on up to the middle of the month. But where the young plants are already above ground their chances of standing a severe winter are greater. As the season advances the quantity of seed must be increased.

*Hop gardens.*—The poles should now be all set up, and the bine carted off, either for bottoming the yards, for stacking, or for mulching young plantations of ash and chestnut. During dry weather old poles may be removed, new ones brought on, and manure be carted on and spread, either for ploughing or digging in. Where the gardens have not been hilled up during the summer a portion of the manure may be scattered over the hills as a protection. Rags and long wool manures, as well as bones, should at once be dug in. Plant up new gardens with bedded sets. Intervals of seven or eight feet are preferable to lesser ones. More sun and air are admitted, less mould is produced, and larger crops of better quality may be grown. Dig heavy working gardens at once, reserving the more friable soils until after Christmas. Cut down, sharpen, shave, and bed up poles for summer dping.

*Root Crops.*—Mangolds should now be clamped and safely covered up, more soil being added before severe frosts come. Swedes for feeding in the yards may be drawn, topped, and cleaned, and afterwards carted and stacked near at hand. Those required for folding off after Christmas should be drawn, topped, cleaned, stacked, and covered in the fields, where they may afterwards be passed through the turnip-cutter and fed off in troughs. White turnips will now be fit for use, and a liberal supply may be given to cattle and sheep, and some boiled for the pigs. Turnips may be drawn, cleaned, &c., at from 7s. to 9s. per acre, and mangolds from 8s. to 12s. Carrots raised with a fork and clamped ready for carting may cost from 20s. to 25s. per acre to prepare, according to the crop.

*Orchards* should be pruned as soon as the leaves fall. Plant young trees, and mulch or water in very dry weather. Collect pears and apples for perry and cider making, and grind such as soon as they become mellow and cold weather sets in. If made in warm weather these liquors ferment freely, and require great attention to prevent their becoming harsh.

*Live Stock.*—The farm horses will now be busily employed carrying off roots, carting on manures, and ploughing for spring crops. Besides their daily allowance of corn, or instead of a portion of this, some carrots, or even pulped roots may be given them. The feeding bullocks, if still upon the pastures, will require an increase of cake or corn, and shelter by night. Where tied up in the stalls they may be fed four times a day with chaff and corn and sliced or pulped roots, a little long fodder being placed before them at night. Commence with dry food in the morning. Cattle feed faster in the short days' as they are then less disturbed. For the sake of the animals and the manure, use covered sheds wherever such are available. Sheep put up to feed should have about 28 lbs. of roots, and not less than 1 lb. of cake or corn daily. Store ewes may be separated from the rams before the end of the month. Lambs should be well sheltered and regularly and liberally fed. All young stock should be folded at night. Where pastures are much overgrown with oak trees, the cattle often run considerable risk of overfeeding upon acorns in an abundant season. These sometimes produce stoppage and cause losses.

*Hedges.*—Cut back, or plash, and relay old hedges, and plant new ones of all kinds except holly. Fill up gaps, and dig and clean hawthorn and other fences. Where such are not too much exposed, well rib-in hedges which have become too spreading.

*Irrigation* should be carried on wherever there is a sufficient supply of water. This requires careful regulation. Use the roller in dry weather. Turn on and off twice a week, but never expose the young grass to a keen and frosty air by turning off in severe weather.

*Dairy cows* will require the same treatment as last month. But as the meadows become barer their allowance of hay, cake, or roots must be increased.

*Poultry* will not require so wide a range as formerly. When eggs become scarce feeding on buckwheat and boiled bullock's liver is said to improve the laying. Force turkeys and geese, and dispose of fat ducks.

*Estate Work.*—This will comprise the carting of trees to the planting sites, carrying composts, collecting leaves, and also the cartage of fuel, draining pipes, and fencing materials.

B.

[*Correspondents sending letters signed with initials or fictitious names are requested to enclose their name and address, as otherwise their communications cannot be inserted.*]

## ARE TREES INJURED OR BENEFITED BY THE DECOMPOSITION OF THE PRUNINGS WHICH MAY SURROUND THEM?

SIR,—It appears to me that Mr. McCorquodale, Forester, Dunrobin, Sutherlandshire, has evidently spared no pains in getting together his very interesting and able paper which recently appeared in the *Journal* on the above subject, but some of his deductions in the concluding portion of his contribution (see page 213) betrays a want of an intimate acquaintance with the life history of some of the insects he writes about. In trying to refute the popular theory that decaying rubbish encourages the breeding of injurious insects, he instances, as an example of his method of reasoning, that a forest which was never thinned, and no caterpillars were known to be within thirty miles of it, was for two consecutive seasons sadly infested with caterpillars. Where they came from or went to, is to Mr. McCorquodale a "mystery." As he is not a believer in "spontaneous generation" he will readily admit that insect continuity is the result of contact. But how can we account for them getting over the "thirty miles?" A little investigation in insectology will reveal to us that the *sawfly* Mr. McCorquodale complains of, is associated with the imperfect societies of insects. In the insect world we have the perfect and imperfect societies. Amongst the latter are found many sawflies, moths, and butterflies. Many of these societies have a strong tendency to change quarters, and often do so in a very remarkable manner. It is therefore to insect migration we must look for Mr. McCorquodale's visitation. Sometimes insects will appear in districts in untold numbers, and disappear equally as mysteriously as they came. Thirty years ago we saw a similar occurrence to what Mr. McCorquodale describes. At that time an entire plantation was so completely overrun with the larvæ of a sawfly, that every tree presented in the month of June a December nudity. The second season a few caterpillars appeared, and the third season there were none. The scourge seemed over. I could only account for their appearance by an emigration of flies into the district, and their disappearance to local circumstance. Insects will increase or decrease according to the nature of the district, whether conducive to their development or otherwise. It does not require such a large number of flies to produce a fabulous array of caterpillars. A single *chermes* lays for each brood over one hundred eggs, and two or more broods are produced in a season. The migration of flies explains any apparently phenomenal visitation of caterpillars. That the plantation Mr. McCorquodale writes about as devoured with caterpillars had never been thinned, lends him no support in his theory that decaying rubbish does not encourage the breeding of injurious insects.

Speaking of the fir weevil so destructive to young trees planted on ground from which a crop of timber has been cut, our author says: "I am not aware anybody found them doing any harm to a plantation, say five years old, or to young trees above 3 ft. high." There is some ambiguity connected with his method of reasoning here. Is it to be inferred that after the trees have been five years planted, the insect ceases to inflict any injury, or are we to suppose that if trees, the height he mentions, are planted the weevil will not attack them? No such limits are to be found. I have seen trees attacked much older and taller than Mr. McCorquodale has been aware of, which shows the absurdity of building up theories on the limited observations of a single individual, or the facts of a single district imperfectly reasoned and inaccurately analyzed. What we see, we believe, but then we go no further than the fact before us. Sometimes, it is true, we try to give a reason for the occurrence, but why should we found our theories on data collected without due regard to the laws which govern cause and effect.

It being a well-known fact that fallen timber is the breeding ground of many destructive insects, I strongly recommend surface burning when successive planting is contemplated. This is the safest method of destroying the fir weevil in its different stages of formation. If, for special reasons, the surface cannot be burned, it is well to delay planting for a few years until the weevils are exterminated, but as this occasions delay and loss of time, I shall be glad to hear of some other effectual method of preventing the attack of these insects.

I concur with Mr. McCorquodale in saying that decaying rubbish has nothing to do with the larch bug *Chermes larice.* He says, however, that he never saw larch over forty years old suffer from them. I do not know that larch over the age he speaks of are exempt in the north of Scotland, but I do affirm there is no such limit here, and in other countries where I have been.

In the discussion connected with the larch bug, Mr. McGregor very properly suggested to the members of the Scottish Arboricultural Society that preventive measures should be taken in hand by nurserymen, and no infested plant allowed to remain a moment after being observed. I believe the spread of the insect is entirely due to neglect of those rearing seedlings. Seedlings are liable to attack, and I hold that the insect is conveyed to the seed bed in the egg state, and considering their extraordinary fecundity, one single egg is sufficient to infest thousands of plants. It is therefore highly necessary to watch and weed out, and burn every plant having the slightest appearance of *Chermes larice*

Some members of the Scottish Arboricultural Society seemed at the recent meeting to mix up the blister found on larch with the presence of *Chermes*, but how they could succeed in doing so is as great a mystery to me as the shape and habits of the male *Chermesenæ*.

*Ballinacourte, Tipperary.* D. SYM SCOTT.

## THE CHILIAN PINE.

SIR,—We read of the *Araucaria Imbricata* or Chilian Pine being first introduced into this country by Mr. Menzies, surgeon, who accompanied Vancouver's expedition, and presented them to Sir Joseph Banks, who sent them to Kew in 1796. Can any of the numerous readers of the *Journal of Forestry* say what firm of nurserymen sent out the *Araucaria* from 1796 to 1830? I am aware it was sent out largely by the late Mr. Skirving, of Liverpool, in 1835-6, and following that by Mr. George Cunningham, Liverpool, in 1837; also by Messrs. Youell and Co., of Yarmouth, about the same date. D. D.

## DOES FROST KILL GRUBS?

SIR,—Will you allow me to point out a slight typographical error (or omission) in your paragraph, "Does frost kill grubs," p. 416.

The reading of "10 degs. Fahr." should be preceded by the sign of substraction (thus, — 10 degs.) to show the temperature was ten degrees *below* zero, and thus that the larva endured forty-two degrees of frost as stated.

I may add that the experiment was kindly tried for me by Mr. Whipple, the superintendent at the Kew Observatory, where by artificial means a much lower temperature can be obtained than is to be met with from natural atmospheric states even in the severest winters in this country.

For practical purposes it may be worth noting that the "Daddy long legs" grubs may be frozen till they are brittle, and can be snapped like sticks, without suffering any inconvenience after being thawed back to life and power of movement.

Some further notes, with which I have been favoured, and my own obser-vaions, showing the length of time these grubs will stand total immersion in water and in solutions of various chemicals, also their power of standing absence of any food except what may be obtained from earth, I am now preparing for publication, together with notes of agricultural treatment which has satisfactorily counteracted the bad attack this season, and which I hope may be of service in preventing these attacks.

*Isleworth, Oct. 14th.* ELEANOR A. ORMEROD.

## HIGHWAY TREES.

SIR—There is nothing more striking to persons visiting the Continent whether it be in France, Germany, Switzerland, or Italy, if they are observers of tree growth, than the immense amount of pains bestowed upon the planting of trees by the sides of the highways. It is quite true that in the height of summer wayfarers in those countries have more need of shade than we have in England, but, nevertheless, it is universally allowed that in our towns and their suburbs a very great boon would be conferred upon the community, if trees could be successfully established along the roadsides. Smoke is the principal hindrance to the success of any efforts in this direction, but as the favourite tree abroad, for avenues, is the one above all others capable of withstanding the effects of our sooty atmosphere, namely, the Western Plane tree, *Platanus occidentalis*, and the Thames Embankment affords a recent proof of this capacity, I would like to ask your readers, How far north of London this plane has been found to flourish]? The next question worth considering is what tree most nearly approximates the plane in resisting coal smoke? I am inclined to give the preference to the sycamore (*Pseudo Platanus*) and the horse chestnut. Such absurd attempts are sometimes made by urban authorities to create avenues, that it would be useful to ventilate the subject widely. Our Continental neighbours scarcely ever fail in their efforts, and we may all learn something from their practice. I observed in Savoy (whence I have just returned) that the plane sheds its bark more completely than with us, the stems looking quite white and ghost-like at night.

W. LIPSCOMBE.

*Heath, Wakefield.*

## THE LARCH BLIGHT.

SIR,—In reply to your correspondent's letter on the "Larch Blight" at page 383 of this month's *Journal*, I have pleasure in corroborating his opinion, so far that it is the frost which causes the blight, while the *Adelgis laricis*, or aphis, is only the effect. Your correspondent, however, seems to infer that the mischief is due to the winter's frost, while I consider the late spring or early summer frost (such as we have had this last June, accompanied with cold, hard winds) do most damage.

The aphis blight came first under my notice forty years ago, when under Mr. Balden, on Lord Blantyre's estate, in East Lothian. The mode of cure adopted at that time made a lasting impression on my memory, viz., the sowing of quicklime in a plantation of larch from 8 to 12 feet high on a wet morning, the operation being anything but agreeable, and only partially successful.

JOHN M'LAREN.

*Hopetoun, October*, 1880.

## THE LARGEST LARCH TREE IN WALES.

SIR,—Having seen in a recent number of your *Journal* the measurements of a large larch tree in Ireland, I took the opportunity of measuring the largest larch tree in this part of the country, namely, at Penpont, the property of Mr. Penry Williams. This tree is standing alone on the lawn, on a dry slope of loamy soil, upon the old red sandstone formation, and the situation is well sheltered from the west wind, the scourge of this district. The circumference of the stem at the ground is 19 ft. 7 in., and at 3 ft. high 13 ft. 10 in., the spread of branches from north to south 106 ft. I had no means at hand of measuring the height of this tree. Its most remarkable feature is the area covered by the branches, which I estimate at 980 square yards=30 perches 48 yards.

*Castle Madoc, Brecon,* 16*th Oct.*, 1880. H. Penry Powel.

## WOOD ON FIRE IN MORAYSHIRE.

Sir,—In reading the notice of a "Wood on Fire in Morayshire," in the October number of your *Journal*, on page 415, I find your correspondent is either ignorant or was wrongly informed in a few of his statements.

First.—He says the fire was discovered about three o'clock in the afternoon. It was discovered immediately after the train passed, going south, which leaves Forres at 1.45 p.m.

Second.—He speaks as if no one was there to render assistance till the surface-men arrived. I beg to inform him differently, as long before they arrived most of the men employed on the estate were there and had the fire pretty well got under.

Third.—He says the total extent of forest destroyed was about thirty acres. The total extent was 6 acres 1 rood.

Fourth.—He says it was smouldering at a late hour the same night, but all danger of further damage was past. But I must inform him that the danger was not passed, for it had to be watched, day and night, for a week.

Peter McLaren,
*Altyre, Forres,* 12*th October*, 1880. *Forester.*

[The "Correspondent" was a paragraph in a Scotch newspaper Some of our correspondents in the North are far too dilatory on such occasions. Had Mr. McLaren promptly reported the fire to us, there would have been nocause for complaint.—Ed. ]

## SALES OF BRITISH TIMBER.

Cardiff.—On Saturday, October 23rd, Messrs. Stephenson, Alexander, and Co. offered for sale, at the Cardiff Arms Hotel, the Cwmkiddy Woods, now standing at Porthkerry and Barry, the property of Colonel Romilly. At the conclusion of the bidding Messrs. John Howells and Sons, timber merchants, Cardiff, were declared the purchasers.

Cullen, N.B.—The annual sale of wood in the Cullen House plantations, Banffshire, took place on the 16th ult. when 368 lots were exposed, consisting of oak, ash, elm, beech, and fir. The attendance was very limited, and the prices obtained correspondingly low. One oak sold for £6 6s.; fir realized 10d., ash 1s. 6d. to 2s., elm 2s. to 2s. 6d., and oak 2s. 6d. to 3s. per cubic foot.

## ANSWERS.

63. The Weymouth Pine.—In reply to "Planter," page 253, regarding the Weymouth pine, I may state that the soil best suited for its growth consists of a light clay loam, rather sandy, with a dry bottom. I know of some fine trees which, I suppose, are about fifty to sixty years old, growing at an altitude of from 600 to 700 feet, upon a dry clayey loam, on the face of a rocky hill. Planted among hardwood, silver fir, and Scots pine, the *Pinus strobus* is equally as good as the Scots pine, making a good yearly growth of from 18 to 30 inches when about twenty years of age. I have seen it stated that it requires a sheltered situation, but I have seen it planted in open and exposed sites, where it is growing freely. It should be but sparingly thinned, as it is apt to form contending leaders, and become bushy and straggling. If it is planted in wet or mossy land the leaves become of a sickly colour early in the autumn, and the branchlets are inclined to become bare of foliage. Where it has good soil of a suitable nature it develops its silvery green foliage freely, and soon becomes a beautiful tree. I know there are some plantations of it in the south. Cannot some of your readers there take pen in hand and give us a description of them, stating whether the timber is valuable for boarding, posts, or other purposes? which would, I have no doubt, find a ready corner in your welcome *Journal*.—Pinus Strobus.

Destruction of Wasps' Nests.—One of the most effectual, and certainly one of the cheapest and safest methods of destroying such wasps' nests as are placed in the grounds is to apply common coal gas tar. The tar should be poured in by the hole forming the entrance to the nest, until the cavity underneath is completely filled up. If this is properly done, a second application is rarely if ever necessary.—R. R. B., *Dunse*.

## QUESTIONS.

71. Prevention of Suckers springing from Roots.—Can some of your readers give me a recipe for preventing the roots of trees from springing into growth after they are cut down, without being at the expense of trenching?—R. R. B.

72. Berberis Darwini Seed.—Will you inform me what treatment is required for the seed of *Berberis Darwini?*—whether it requires to be rotted, such as hawthorn, holly, &c.—G. B.

[The seed is easily washed out of the berries, and should then be spread out in the sun and dried. It may be sown at once, but it is better to be kept over the winter and sown in March.—Ed.]

## OUR FOREIGN EXCHANGES.

There have been received from France *Revue des Eaux et Forêts*, No. 10: from Spain, *Revista de Montes*, Nos. 88 and 89; several copies of contents of *Tratado de Maderas de Construccion civil y Naval*, por Don Eugenio Plà, y Rave; and by myself reports of proceedings of the *Congreso Filoxerice de* Taragoza: from Italy, *Nuova Rivista Forestale*, No. 5: from Wurtemburg, *Baumphysiologische Bedeutung des Kalten Winters*, 1879-80, *von* Forstrath, Dr. Nördlinger: from Austria, *Handelsblatt für Walderzeugnisse*, Nos. 38, 39, 40; and *Oesterreichische Gartenlaube*, Nos. 30, 31: from Bohemia, *Haj*, No. 9; *Lovena*, No. 9; and *Domacnost*, No. 9: and from Russia, by myself, *Otchet po Laesnomu upravleniou Ministeerstva Gosudarstvennich Eemushchestv*.

The following is a translation of a circular issued by the Forest Department of the Ministry of Domains:—"The insufficiency of the statistics relative to the forests of Russia and their productiveness and the meagre information as to the quantity of the produce afforded by these forests, both for the supply of local requirements and for export, have induced the Ministry of the Imperial Domains to undertake a comprehensive inquiry into the present condition of forest management and of the wood trade in European Russia. It is intended to collect the most trustworthy information regarding the condition of the forests and forest management, the modes of preparing the timber, the conditions of transport and sale on the spot, and in the markets to which it is despatched, with the view of determining the importance of the wood trade in the economy of the country, and discovering the hindrances to its development. In order to attain the greatest possible completeness and uniformity, a programme of questions, embracing the various aspects of forestry, has been drawn up, on the basis of which a commencement has already been made everywhere with the collection of evidence regarding the wood trade and forest management. The Ministry of the Imperial Domains being conscious of the laborious and complicated nature of the undertaking, and in order to avoid one-sidedness in the results, has not confined itself to the collection of information from merely official sources but has thought it necessary to invite general co-operation in the work. With this latter purpose the programme of inquiry has been distributed to all the rural magistrates, as the authorities most intimately acquainted with the condition of forestry in their several districts, requesting them to furnish such information as may be at their disposal, or as they may be able to collect. The programme has also been communicated to a considerable number of forest proprietors and wood merchants, from whom, as individuals directly concerned in the wood trade, very valuable data may be expected. The entire material thus collected, after being verified on the spot by persons specially deputed for the purpose, will be digested and published. Keeping in view that many private individuals, interested in forestry, but not known to the Ministry, may be able to render important help in elucidating the present condition and wants of the wood trade, the

Forest Department appeals to them to supply it, as far as in their power, with answers to those questions in the programme on which they may be specially informed."

In the *Handelsblatt* is a continuation and conclusion of a report on the timber production of the State forests of Austria, by Dr. Gustav Marchet, continued from Nos. 35 and 37, concluding with a report of the production of some single forest estates in Austro-Hungary.

Dr. Nördlinger, Professor of Forest Science in the Royal Wurtemburg Academy of Land and Forest Economy at Hohenheim, in his paper supplies valuable information, with explicit statements of observations on the effect of cold during last winter on arborescent vegetation.

In the Italian *Rivista* is given a continuation of papers which had appeared in two preceding volumes on the determination of the timber contents of a forest by calculation, based on the cubic measurement of the trunks; and a paper on the amelioration of the region of malaria in Italy by culture of the *Eucaylptus.*

In the *Revista* of Spain is given a paper on the mode of reproduction of the *Philoxera vastatrix* and the damage done by it to the vine, read by Don Adolfo Parada at the conference on the ravages of the Philoxera, held at Xeres on the 20th July, 1879; and the reports of the proceedings of the congress held in the beginning of last month (October, 1880) at Saragossa, speak loudly of the great destruction of vineyards in vine-growing countries which has been occasioned by this aphid.

JOHN C. BROWN.

## THE PINE BEETLE (*Hylurgus piniperda*).

THE following remarks upon this destructive tree pest are extracted from a recent communication, by Mr. Frank Buckland, to *Land and Water*:—

"Mr. George Pollock, when walking round his plantations in the neighbourhood of Bagshot a few days since, observed a considerable number of the tops of his fir trees lying about the paths. He asked his gardener what was the cause of these fir tops falling off the trees in this way, and the gardener at once answered, 'Squirrels.' This did not satisfy Mr. Pollock, who, examining the fallen portions—which were about from six to nine inches long—of the fir trees, found in every case a hole bored into the woody portion of the fir top, as though some insect had gone in. Following this hole upwards, he discovered that the fir bough was completely tunnelled out, as if the hollow had been made by a centre-bit. At the end of each tunnel Mr. Pollock discovered a little insect lying cosy and comfortable in a cavity which just fitted him, and which he had eaten out for his own accommodation. This destructive little brute rejoices in the name of *Hylurgus piniperda.*

"He is about as big as a large ant, and when looked at through a magnifying glass is like an elongated cockchafer. He has exceedingly formidable nippers, and the bottoms of his feet are armed with hooks so as to enable him to hold on. He is also capable of flying, having a fair pair of wings; and he is, moreover, covered with spines, probably to prevent him slipping out of his tunnel.

"To the proprietor of Scotch plantations the ravages of this little insect are of the highest importance, as they get into the shoots of the fir trees, often into the leading shoots, thus very much injuring the upward growth of the tree, or otherwise deforming it so that its value as timber becomes greatly impaired.

"To my personal knowledge the Scotch proprietors, as well as their foresters, generally attribute this falling off of the fir tree shoots to 'squirrels,' saying that the squirrels nip the shoots off with their sharp incisor teeth. [What do Scotch foresters say to this?—Ed.]

"Since Mr. Pollock has been wise enough to call public attention to the matter it becomes obvious that the squirrels are not to blame, but this little insect, who is so minute as hitherto to have escaped observation, is really the cause of the mischief.

"I trust the Scotch papers will notice this article, as the proprietors of fir plantations will now be enabled to examine the fallen shoots of their fir trees, and see if their woods are infested by this mischievous parasitic insect. I am afraid I can suggest no practical remedy except strictly preserving woodpeckers, wrynecks, tomtits, and all insectivorous birds, and taking very great care that the fallen shoots shall not be allowed to lie about, but be collected and burnt as soon as possible.

"T. Curtis, in his *British Entomology*, describes the way this destructive beetle works its boring apparatus. 'For the purpose of examining its proceedings more narrowly I placed a shoot of Scotch fir under a glass with the insect. In about three hours afterwards it had begun to pierce the bark of the base of one of the leaves. Its mandibles seemed chiefly employed, its legs being merely used as a means of fixing itself more firmly. Four hours afterwards its head and thorax were completely buried in the shoot, and it had thrown out a quantity of wood, which it had reduced to powder, and which nearly covered the space under the glass. In sixteen hours more it was entirely concealed, and was beginning to form its perpendicular excavation, and was busily employed in throwing back the wood as it proceeded in destroying it. There were evidently two kinds of this sawdust, part consisting of shapeless lumps, but the greater portion of very thin semi-transparent lamella, or rather shavings. I now examined it every day till the fifth, when I found it had emerged through the central buds at about an inch from where it first entered.

"'This tiny beetle, capable of killing whole forests of pine and fir trees, is only about the sixth of an inch in length, and of a somewhat cylindrical form. Its colour varies from nearly black to dingy red or dull buffish, with lineate-punctate elytra.'

The *Hylurgus piniperda* is a species of beetle well known to be destructive to pine trees in all stages of their growth. The insect is figured in Miss Ormerod's 'Notes of Observations of Injurious Insects' for 1879, and the following remarks on its habits are there given:—

"'They attack the annual growths on the extremities of the branches by boring from the side of the tender shoot into the pith, and then follow the pith for an inch or two towards the point of the shoot. This is done in summer; and the following spring, during high winds, these shoots are blown off. The injury to side shoots is bad enough, but the effect of the leading shoot being blown off is for the trees to be often bushy-headed; and when the tree is thus affected it retards it in growth and reduces its ultimate value. When young fir plantations are thinned, all the brush ought to be at once removed or burnt on the ground, as this beetle propagates in the decaying branches in legions. They ascend the standing trees, and commit extensive ravages. When fir thinnings are carted from the plantation it is a very common practice to dress the bark off to lighten the carriage in transit to market. The dressing off of the bark should not be permitted within the plantation. In a year after, the ground round these heaps of bark may be seen covered with grown shoots blown from the growing trees, bored by the beetles which the heaps have nurtured."

## THE PITPROP TRADE.

The Tyne correspondent of the *Timber Trades Journal* reports the arrival of considerable quantities of pitwood from Norway and Sweden, the supply of which seems to be unlimited; and as much of the present importation has come forward on consignment, prices are reported to be easy. Stocks are large, and the demand remains only feeble. Prices are reported for cut props from 2s. 9d. to 3s. for 3 in., and from 6s. 3d. to 6s. 6d. for 5 in. per 72 ft. run, from alongside ship in the Tyne. Mining timber is reported at about 32s. for round and 27s. for square, per 50 cubic feet, but for all these goods the demand is very small. Under a later date from the same source we gather that in mining timber and props the tendency is downwards, and, as stocks are large, the appearances are against any prospect of an advance. The Gothenburg steamers are bringing every week considerable quantities of wood goods, principally pitprops, much of which has been placed to stock for some few weeks past. Under these circumstances there certainly does not appear to be much encouragement at present for sending pitwood to the colliery districts of England.

## FOREST DEPLETION IN WESTERN RUSSIA.

In consequence of the reckless and extravagant felling of timber that has prevailed throughout Western Russia during the greater part of the present century, several of the streams feeding the Dnieper have become dried up, whilst others contribute so little water to the great river that its navigation has already suffered serious prejudice, and is in some portions of its course threatened with absolute interruption. Rocks and sandy islands in great number, forming sections of its bed, may now be seen where a few years ago from twelve to fifteen feet of water hid them from view. As the Dnieper traverses and largely contributes to the prosperity of no fewer than nine Russian provinces, or "governments," this falling off in its dimensions and capacities is in reality little short of a national calamity, for which, however, Russian landowners and the Mir have only to thank their own ignorance and improvidence. Enormous tracts of forest abutting on the Upper Dnieper have been within the last few years completely denuded of trees, and the huge woods formerly covering the districts watered by the Lower Dnieper, now for the most part arid steppes, vanished before the axe so long ago that men of middle age scarcely remember their existence. Similarly the forest lands of the Beresina, Pripet, and Desna, three important feeders of the Dnieper, have been laid bare by their boyar and peasant proprietors to such disastrous purpose that those once broad and potent rivers have dwindled to insignificant streams. In tolerating such wholesale destruction of timber the Forestry Department in the Russian Home Ministry cannot but have been grossly neglectful of the supervision and control which it is fully empowered to exercise over private as well as imperial property throughout the Czar's dominions.

## THE HEMLOCK SPRUCE.

WHAT a beautiful tree is the hemlock spruce when seen in its true character—so perfect is its verdure throughout the year, so light and feathery its foliage, so gracefully irregular its outline! Whether planted as single specimens or massed, it forms, when in good health and vigour, a charming feature in the garden or woodland landscape. Unfortunately, it is somewhat peculiar in its likings, requiring for its perfect development a combination of conditions not usually found in gardens, but which are frequently to be found on estates where portions of the land are devoted to forest trees. On the margins of small woods, or in mixed plantations where much of the vegetation is of a robust character, provided the soil is of the right description, the hemlock appears much more at home than when planted in open places. It appears, indeed, to need nursing through the whole period of its existence, according to my experience never thriving kindly when fully exposed to cutting or rough winds. In this district it is by no means uncommon to see the hemlock in good condition; but wherever found growing freely the soil is sure to be of a somewhat light, warm description, and the position more or less sheltered. Hitherto I have failed to find a perfect specimen growing in stiff loam, or in a wind-blown position.

My experience tends to the conclusion that it is utter waste of time to plant this tree in damp, undrained, or low-lying situations, and that unless the roots can enjoy a free run into soil of a very sweet and somewhat porous character it fails to attain that amount of luxuriance necessary to give a true idea of its beauty. Nothing in the way of an evergreen tree can excel this conifer in beauty of form or richness of verdure when its requirements are satisfied, and few trees are so unsatisfactory when either soil or situation or both are unsuitable. The finest specimens of this spruce I have seen were at St. George's Hill, Surrey. I have occasionally come across specimens as large, but never met with any to equal these in general health. Amongst your readers are probably some who have a special liking for this beautiful evergreen, and to whom a few details concerning the trees in question may be of interest. Some, too, who may have failed to realize good results with this tree may, when made acquainted with the conditions on which it attains such luxuriance, be induced to make fresh attempts to establish it; for I feel certain that were its requirements better known it would be much more extensively planted than it now is.

The trees at St. George's Hill are all so situated as to be completely screened from cutting winds of all descriptions, and the roots can travel far and wide in a soil composed to a great extent of vegetable matter. The finest group of all is rather peculiarly situated. The surface of St. George's Hill is much undulated, the undulations being in places of such an abrupt nature as to produce situations perfectly sheltered on all sides, yet lying so high that a good depth of rich fine well-drained soil exists for the roots to work into. It is in such a position that the best group of hemlocks is growing; and a very beautiful, fresh, and pleasing picture does the mass of lustrous green foliage present during the winter months. In a word, in this neighbourhood, composed mainly of large oaks, with an undergrowth of rhododendrons, the hemlock thrives vigorously, appearing to delight in shelter and partial shade, the roots finding a congenial home in the body of vegetable mould, the accumulation of many years. When the oaks shed their leaves, the graceful habit of the hemlock stands fully revealed, forming in mid-winter a charming contrast to the naked trunks and leafless branches of the trees with which it is associated.—J. C., in *The Garden.*

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SALE OF HARDWOODS AT DARNAWAY FOREST.—The annual sale took place in Darnaway Forest on October 13th. The greater proportion of the timber offered for sale consisted of oak of good quality, and suitable for ship and boatbuilding purposes. There being a good attendance of timber merchants, boatbuilders, fish-curers, cartwrights, &c., a spirited competition was experienced, which resulted in satisfactory prices being obtained. The following is an average of the prices realized for the different classes of timber:—Large oak timber from 2s. to 2s. 6d. per cubic ft.; medium size, from 1s. 6d. to 1s. 9d.; smaller, from 9d. to 1s. 3d. Elm, medium size, from 1s. 6d. to 2s.; small size, from 10d. to 1s. 3d. Ash, medium size, from 1s. 9d. to 2s. 2d.; smaller sizes, from 1s. to 1s. 6d. Oak burnwood, for fish-curing purposes, 12s. 6d. per ton; birch, for bobbins, 10s. per ton; firewood, from 7s. to 9s. per ton; good larch, 1s. 3d. per ft.; secondary, 10d. to 1s. per ft. The principal purchasers were Messrs. McEwen and Sutherland, Wick; Messrs. Wilson and Bain Forres; Asher, Burghead; Main, Henderson, and Leddingham, Hopeman; Woods, Slater, and McConnachie, Lossiemouth.

Preventing Damage by Ground Game.—Messrs. R. Davidson and Co., of the Scottish Colour Works, Leith, are the manufacturers of a composition for effectually preventing hares, rabbits, and deer doing damage to young forest and other trees. The advantages claimed for this article are that it is free of any poisonous substance, it encourages the growth, is easily applied, and further, it is very highly recommended by a great number of influential estate owners and foresters who have used it. We have, therefore, no hesitation in directing general attention to it.

Timber Felling.—Much as I admired the timber about the chase, I could not help sometimes wishing to have a chop at it. The pleasure of felling trees is never lost. In youth, in manhood—so long as the arm can wield the axe—the enjoyment is equally keen. As the heavy tool passes over the shoulder, the impetus of the swinging motion lightens the weight, and something like a thrill passes through the sinews. Why is it now so pleasant to strike? What secret instinct is it that makes the delivery of a blow with axe or hammer so exhilarating? The wilder frenzy of the sword—the fury of striking with the keen blade, which overtakes men even now when they come hand to hand, and which was once the life of the battle—seems to arise from the same feeling. Then, as the sharp edge of the axe cuts deep through the bark into the wood, there is a second moment of gratification. The next blow sends a chip spinning aside; and, by-the-bye, never stand at the side of a woodman, for a chip may score your cheek like a slash from a knife. But the shortness of man's days will not allow him to cut many trees. In imagination I sometimes seem to hear the sounds of the axes that have been ringing in the forests of America for a hundred years, and envy the joy of the husbandman as the tall pine toppled to the fall. Of our English trees there is none so pleasant to chop as the lime; the steel enters it so easily.—*From "Round about a Great Estate."*

Woodland Tints.—"Trees may be said to change their garments thrice in a season. In the spring the woods at Okebourne were of the tenderest green, which, as the summer drew on, lost its delicacy of hue. Then came the second or "midsummer shoot," brightening them with fresh leaves and fresh green. The second shoot of the oak is reddish: there was one oak in the chase which after midsummer thus became ruddy from the highest to th lowest branch; others did not show the change nearly so much. Lastly came the brown and yellow autumn tints.—*From "Round about a Great Estate."*

A Fine Cedar of Lebanon.—A gigantic specimen of this cedar occupies a good position in the gardens of W. Jones Lloyd, Esq., Langleybury, Herts, its huge and massive branches spreading far and wide. The tree in question measures, at four feet from the ground, 22 ft. 4 in. in girth; the spreading branches extend over a space of 105 ft., and its height is 107 ft. The great weight of its branches after heavy rains or snowstorms is such as to have caused each limb to be tied by iron rods to the main stem, to prevent their splitting off, whereby upwards of 1½ tons of iron have been used to secure it, forming quite a network among the branches. Fine specimens of this size, of such clean growth, are not an every-day occurrence.—*Gardener's Chronicle.*

**Obit.**—We regret to notice the death on the 14th inst., at Dunipace House, Stirlingshire, of John Harvie Brown, Esq., of Quarter and Shirgarton, in his 80th year. Many of our readers will remember Mr. Brown's recent researches into the habits of the capercailzie, and the valuable treatise which he published on the subject.

**Petroleum to Preserve Wood.**—The primary cause of decay in wood is the fermentation and decomposition of the sap that is within the pores. Wood, pure and by itself, is not easily destroyed by the ordinary agencies of nature, namely, wet and dry weather, heat and cold, &c. If the sap within the pores can be either removed or rendered inactive, the wood may be preserved. There are several methods of doing this, such as saturating the wood with mineral salts, creosote, &c. The cheapest, easiest, and therefore the best method seems to be to charge the wood with crude petroleum. Pine, for example, is made almost water-proof by saturating it with this simple material, and therefore made much more lasting. Crude petroleum is very cheap, and may be applied with a brush until the wood will take up no more. In the application care should be taken to avoid accidents from fire, and not approach the work with a flame until it is dry. An application of petroleum is especially valuable to much-exposed woodwork, as, for example, the shingles on buildings, which by actual experience are found to be rendered much more durable.

**The Black Cinnamon.**—This tree (*Pimenta acris*), known also as *Bois d'Inde*, is a valuable forest tree in the island of Jamaica, and is fast being exterminated. There is no forest law in the island, and the valuable timber is cut down remorselessly, while none is planted. From the leaf of the *Pimenta acris* the far-famed bay rum of commerce is made, an article as well known upon the dressing-tables of America as is cologne. So far as Jamaica is concerned the production of this article must soon cease, as the manufacturers buy the leaves by the hundredweight, and to obtain them the negroes chop the trees down, thus effectually putting a stop to their reproduction. While the forests of Jamaica have in past years presented a good assortment of valuable trees, there has been for several years an annual cut of 40,000 acres of forest and bush land, and no use has been made of the timber but to burn and destroy it, while at the same time importing even railroad ties from the United States, the importations yearly amounting to 250,000 dols. This rule of devastation is largely practised in other of the West India islands.

**The Evergreen Oak.**—How pleasant it is in a wind-swept land with the crisp waves of the German sea rolling in near to see how nobly the Evergreen Oak stands the tempests, and comforts the land with welcome shelter to man and beast! The Holm or Evergreen Oak is surely as well known as any of our trees, and yet it is odd that it is seldom one sees it set to work, so to say, except in great places, such as Goodwood or Holkham. Where the other trees are stripped by winter and his winds, this, like the little green alpine mossy Saxifrage, faces him with refreshed verdure, and is so regardless of the storm that it does not even bow before it, as the hardiest native trees will when hard-pressed in a similar country. Surely this tree would be as useful to the farmer—or those who wanted close shelter for any purpose—for protecting a hamlet, or an orchard, or an exposed coast, as in a park. I was pleased to see the fine colony of the tree near the obelisk at Holkham, where they grew so well. They look even healthier than the Goodwood clumps, though they are smaller. Perhaps the soil keeps them of a darker and more healthy hue than the light spit of soil over the chalk at Goodwood.—*Garden.*

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# EDITORIAL NOTES

THE many advantages which landowners and the public generally would derive from the extensive planting with forest trees of the wide tracts of waste land in this country, have been so often discussed, and the profitable nature of planting such places so clearly proved, that an intelligent observer of men and things must be quite at a loss to understand the slow progress that is being made in this remunerative and highly-beneficial work. It is, moreover, somewhat surprising that those who are most deeply interested in the matter—the owners of these wastes—display so little interest in the matter. It cannot be the want of means, because money is forthcoming to any amount at the present time for any sound investment that will return the smallest margin of profit. No investment can possibly be sounder than judicious planting on an extensive scale, and with good management these same plantations will return a larger profit than can be realized from almost any other investment of the same perfectly safe nature. Even under any form of management usually practised in this country, such plantations are still profitable in themselves to the owners, besides rendering shelter to the adjacent country, and improving the climate for the rearing of stock and the production of our food crops. Many thousands of acres of waste land are to be seen in almost every county in the United Kingdom, which at the present moment are worth nothing, or at most a merely nominal sum per acre, per annum, to the owners, but which are well adapted for the growth of certain species of forest trees that would soon render their bleak barrenness a thing of the past, and in a very few years would return to the enterprising planter a rent or profit that would increase from year to year, and which no bad season could perceptibly diminish. Much arable land of good quality does not produce so certain a return in these bad times as plantations do even upon very indifferent soil, when well managed. The stagnation of commerce will no doubt lower the profits derived from the produce of woodlands in the same ratio as all other incomes obtained from the produce of the soil are lowered; but trees are not of the same tender and evanescent character as our food crops, which are so much at the mercy of inclement weather, and must be saved or lost in a single season. A crop of trees, on the contrary, may stand over bad times, increasing in value annually, and realize a handsome profit in the end. In the dullest of times a good income can be obtained from plantations properly managed, with the cuttings regulated to suit the market, so that they may be safely depended upon as the source of a permanent regular income, beside giving a large surplus when their full products can be realized to the best advantage in prosperous times. Again, land which has carried a crop of trees is in a very much superior condition for turning to agricultural purposes than land which has lain bare and waste for generations. In every sense, the best, cheapest, and most profitable method of improving poor waste land is by planting it.

Then why should not our philanthropists and land-improvers unite in their efforts to carry out, on a sufficiently comprehensive and extended scale, the systematic planting of the poor and waste land of the country, till between Land's End and John O'Groats, Cape Clear and Rathlin, an acre of "waste" land could not be seen upon which trees could be made to grow? The vast extent of such totally unprofitable land is simply degrading to the boasted civilization of the country. Looking at the matter on purely public grounds, tree-planting is a crying necessity in many bleak and exposed parts where no trees at present grow, and where life exists in a perpetual struggle with the elements, and crops can hardly be produced from the cold and blast-swept soil in sufficient abundance to sustain the population without exterior aid. On bleak downs, dreary moors and wastes, bare mountain slopes, wind-swept islands, and sea-begirt shores, plantations of trees of substantial extent are urgently required for the amelioration of the climate, the protection of the cultivated soil, the productiveness of the crops, and the shelter and genial warmth they afford to man and beast. However, we are quite aware that most of the desert-like tracts referred to are private property, and cannot be treated with a special view to the public benefit; still, in this instance, as in many others, the public benefit and private interests run in exactly parallel lines. By planting for shelter, and utilizing waste land, the proprietor enriches himself and his family, while at the same time he is doing precisely what the public benefit requires. It is not difficult to point to many parts of the country, where the enterprise and foresight of the proprietors have clothed the land with a fair proportion of carefully laid-out plantations, and to districts of no inconsiderable extent where woods and plantations now form the predominant feature and afford remunerative employment to the inhabitants, but which, at a comparatively recent period, were nothing but barren wastes, and bare, bleak, worthless hillsides. The contrast is remarkable, and indicates much stronger and clearer than words can, the path which should be promptly followed by the owners of the far too numerous acres of waste land still existing throughout the country.

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THE Agricultural Returns of Great Britain for the present year, which we noticed the receipt of in our last issue, show the continued progress of rural industry, and the various phases through which it annually passes, in a manner which renders the subject easily understood by the inquiring agriculturist, and they ought to be carefully studied by every landowner and tenant farmer in the United Kingdom. It is satisfactory to observe that cultivation is gradually extending its area throughout the country; the increase of land under cultivation in Great Britain during the year being 126,000 acres, and the total increase in the 10 years since 1870 is said to be no less than 1,694,000 acres, or a greater area than the whole of Devonshire. Of this large increase 1,187,000 acres are in England, 287,000 in Scotland, and 220,000 acres in Wales. In Ireland the cultivated area has increased 22,000 acres during the present year; but owing to an alteration in the classification of the returns, no comparison can be made of the increase in the past decade. The total quantity of land in 1880 under all kinds of crops, bare fallow and grass, in Great Britain, is returned at 32,102,000 acres; in Ireland 15,358,000 acres; in the Isle of Man 97,000 acres; and in the Channel Islands 30,000. Thus the area of cultivation in the United Kingdom in 1880 shows a total of 47,587,000 acres, exclusive of heath and mountain pasture land, and woods and plantations. Among many other items worthy of note by the agriculturist, we observe that the cultivation of fruit and market garden produce is rapidly extending, orchards having increased by 15,000 acres in the years 1879 and 1880, and market gardens by 3,000 acres in 1880—the acreage returned for this year being 180 acres of the former, and 44,000 acres of the latter. The collectors of the statistics, in regard to orchards and market gardens, report that there is a growing demand for both fruit and vegetables, especially in the neighbourhood of towns; however, the remark is added by the compiler of the returns that the uncertainty of the climate for fruit growing must always tend to restrict the extension of fruit plantations, except in naturally favoured districts.

We will now leave matters of agricultural and horticultural interest to those whom it more directly concerns, and turn the attention of our readers to a special return of the acreage of the woods and plantations of every county of England, Scotland, and Wales; the previous return of this nature having been made so far back as 1872. Since that date the acreage under woods and plantations in Great Britain appear to have increased nearly 10 per cent., the figures being 2,187,000 acres in 1872, and 2,409,000 acres in the present year. Of this area England is credited with 1,435,434 acres; Wales 162,135 acres; and Scotland 811,703 acres. As might be expected from its great extent, Yorkshire possesses the largest area of woods and plantations of any county in England, the amount being returned at 125,981 acres. Sussex, which is allowed to be the best wooded county in England, possesses 106,266 acres of woodland—Hants nearly approaching it in its sylvan character, having 103,125 acres. Kent has 80,930 acres; Devon 76,361 acres; Norfolk 50,081 acres; Salop 45,795 acres; Wilts 45,691 acres; and Surrey 41,725 acres. The counties of Dorset, Hereford, Lancaster, Lincoln, Northumberland, Somerset, Stafford, and Suffolk each possess between 30,000 and 40,000 acres of woodland; Berks, Bucks, Cornwall, Cumberland, Derby, Durham, Essex, Herts, Monmouth, Northampton, Nottingham, and Oxford between 20,000 and 30,000 acres each; Bedford, Chester, Leicester, Warwick, Westmoreland and Worcester between 10,000 and 20,000 acres; Cambridge 5,319 acres; Huntingdon, 3,819 acres; Rutland 3,156 acres; and the metropolitan county of Middlesex is only credited with woodlands to the small extent of 2,385 acres. According to their extent, the counties south of the valley of the Thames appear to possess the largest percentage of woodlands. It is somewhat remarkable that the parts of the country which are noted for their genial and salubrious climate are the best wooded; and also that in the cold and bleak districts, where shelter and the mellowing influences of trees are most required, woods and plantations are "conspicuous by their absence!" This fact should arouse landowners in these inhospitable parts and it is certainly an indisputable argument against the theory advocated by some that England is already over-wooded. The fact is that the area of woodlands might be extended to double the present amount without interfering in the least with land suitable for agricultural purposes; and the extension would not only add vastly to the value of property, and the industries of the country, but would improve the climate, especially in bleak and exposed parts, and prove generally beneficial.

The woods and plantations in the Principality of Wales are distributed as follows:—Glamorgan, 23,545 acres; Montgomery, 22,630 acres; Carmarthen, 21,513 acres; Denbigh, 16,408 acres; Merioneth, 14,971 acres; Cardigan, 14,379 acres; Pembroke, 11,178 acres; Carnarvon, 10,570 acres; Brecon, 10,272 acres; Radnor, 7,510 acres;

Flint, 7,434 acres; and Anglesey, 1,725 acres, giving a total for Wales of 162,135 acres, or only about 1,500 acres more than is returned for the county of Inverness.

On examining the returns from Scotland we find the county of Inverness possesses 160,656 acres of woodlands; Aberdeen, 102,824 acres; and Perth, 91,333 acres. None of the other counties reach 50,000 acres of woods; the well-wooded counties of Moray, Banff, and Nairn appearing with a high average, having respectively 49,899 acres, 27,571 acres, and 13,241 acres. Argyle has 42,009 acres; Ross and Cromarty, 42,056 acres; Dumfries, 29,597 acres; Forfar, 28,102 acres; Kincardine, 27,843 acres; Kirkcudbright, 19,801 acres; Ayr, 19,712 acres; Fife, 19,477 acres; Lanark, 18,215 acres; Roxburgh, 15,310 acres; Berwick, 12,740 acres; Stirling, 12,521 acres; Sutherland, 11,940 acres; Edinburgh, 11,392 acres; Peebles, 10,118 acres; Haddington, 9,144 acres; Dumbarton, 7,917 acres; Wigton, 7,680 acres; Renfrew, 5,346 acres; Linlithgow, 4,872 acres; Bute, 3,246 acres; Kinross, 2,576 acres; Selkirk, 2,396 acres; Clackmannan, 1,956 acres; and Caithness, 210 acres. There appear to be no woods or plantations in either Orkney or Shetland, where the want of shelter is most grievously felt. In Scotland, as in England, the woods appear to be very unevenly distributed, and the great bulk of them are in the inland parts of the country between Inverness on the north and Perth on the south. The northern extremity of Scotland appears to be almost destitute of woods; and south of the Forth and Clyde the country can only be said to be very moderately timbered. Indeed, if these returns are even approximately correct Scotland must still in many parts present the treeless aspect which drew forth Dr. Johnson's sarcastic remark that he did not see "a tree in the country large enough to hang a man on." However, there must be a considerable allowance made for the difficulties in obtaining accurate information on the subject, as no really systematic and workable plan has yet been adopted for collecting and tabulating the returns of woods and plantations in Great Britain. Until the work is thoroughly and accurately carried out in all its varied details, the returns are comparatively valueless for any practical purpose. The returns of woods and plantations in Ireland (which we understand are obtained with fair accuracy by the mode of collecting the returns in that country) ought to be incorporated with those of Great Britain for publication and general use. The nature of the crop of trees; average size of the predominant kinds; age, if known; the chief purpose for which the woods exist, such as for shelter, ornament, or market purposes, and other useful details would render these returns of real value to the country. At present their meagreness and doubtful accuracy is most tantalising to the arboriculturist, and we trust that some effort will be made, when the next returns are collected, to have them as full and complete as possible.

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We are informed that an important proposal has recently been made by the proprietor of an estate in Midlothian, that he would feu to the Government at a low rate a highly eligible and conveniently-situated piece of land, running from the environs of Edinburgh to the top of the Pentland Hills, for experimental purposes in arboriculture, agriculture, and horticulture. The said stretch of land comprises a great diversity of soils and aspects, suitable for the growth and cultivation of all hardy kinds of trees and every variety of food crops, and a burn or watercourse, which affords a plentiful supply of water, and could easily be made to form a highly attractive as well as useful object in the landscape. It also possesses a considerable range of altitude, rising from about 200 feet above the level of the sea to the top of the Pentlands, at a height of about 1,600 feet. We trust to hear that a scheme presenting such addition desirable to the other educational facilities of Edinburgh, is treated by the Government with the earnest consideration which its importance deserves, and that this favourable opportunity will not be allowed to pass without a determined effort being made to acquire a permanent establishment for the country, of the nature aimed at in the generous offer.

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Sale of Nursery Stock at Dalkeith.—The well-known nurseries at Dalkeith, which have been carried on by the Messrs. Ballantyne for nearly a century, are now a thing of the past. The sole partner, Mr. John Ballantyne, having resolved upon retiring from business, a three days' sale was held last spring when a large portion of the extensive stock was disposed of at very remunerative prices, but so much still remained that it required another three days' sale, on the 21st, 22nd, and 23rd of October, to effect a clearance. At the latter sale the lots numbered about 2,000, and comprised a great variety of choice conifers and other ornamental trees and shrubs, for which the nursery has been long celebrated. The company attracted by these choice lots keenly competed for the possession of them, and also for the grand collection of specimen rhododendrons, which both realized handsome prices. The sale was conducted with great ability by Mr. David Mitchell, Horticultural Auctioneer and Valuator, Edinburgh, and Mr. Ballantyne entertained the large company to luncheon in the grounds on each day of the sale.

# APPLIANCES USED IN FORESTRY.

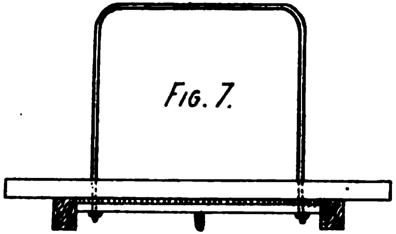

FIG. 7.

TRANSVERSE SECTION AT a. b.

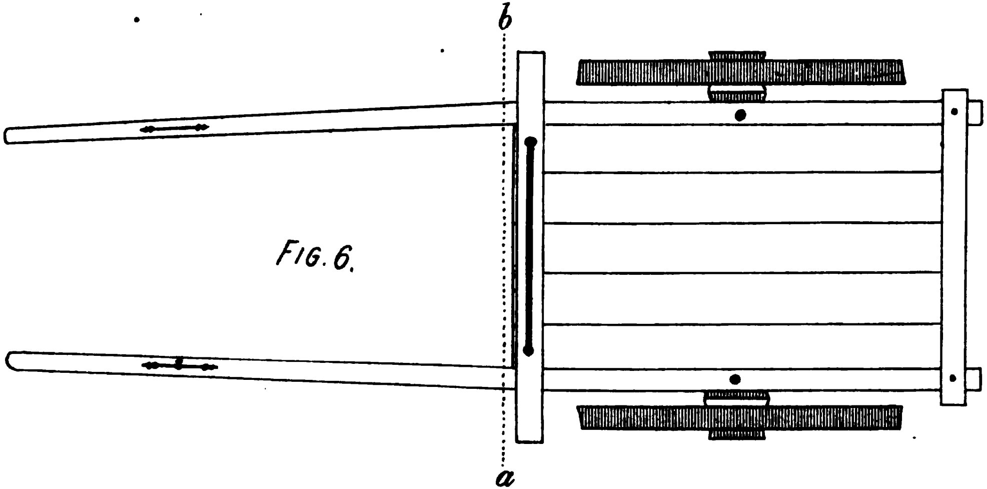

FIG. 6.

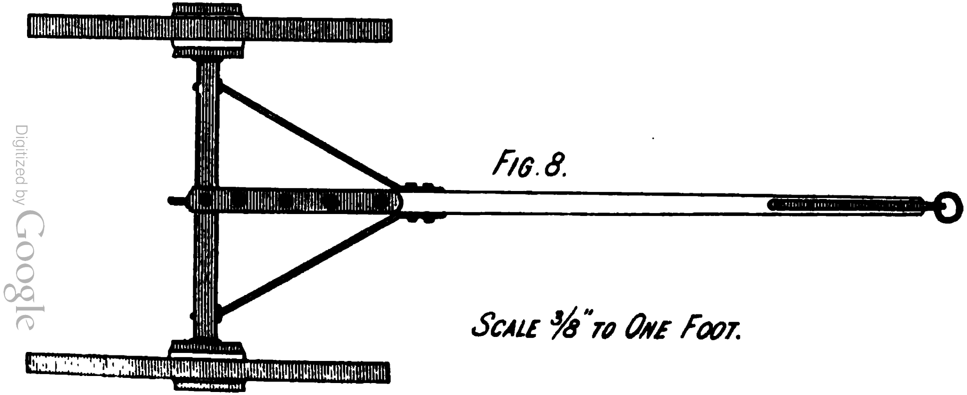

FIG. 8.

SCALE 3/8" TO ONE FOOT.

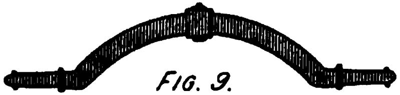

FIG. 9.

A. S.

# Appliances used in Forestry.

By A. SLATER, Land Steward, Wyreside, Lancaster.

(*Continued from page* 427.)

The size of timber most suitable for removal by the timber carriage is that in lengths over 20 ft., and may include planks, boards, or scantlings, &c.; also poles and trees measuring up to 2 ft. on the side. Timber in lengths, whether sawn or rough, under 20 ft. will be most economically carted by the two-wheeled wood carts, which are in general use in Scotland for transporting all kinds of forest produce. If the woods be open and the nature of the ground otherwise convenient, the carts may be moved about through the plantation, and taken alongside the timber that is to be removed, thus obviating the necessity of having it dragged to one particular spot for loading; and the weight of timber that can be put on one of these carts would be incredible to the uninitiated; in fact, when carting short distances, say about two miles, I believe I shall be within the mark when I state that an experienced carter, with a single horse and cart, will remove as great a weight of timber as can be done by many with the waggon and a pair of horses, and that—provided the wood is ready for loading—with little assistance but that of his horse.

In fig. 6 is given a superficial view of this cart, which may be—with the exception of the wheels—constructed of sound tough larch, and the workmanship must be of the strongest description. The shafts are shown in the sketch to have a slight cast inward, and are preferred by some in that way, but greater strength is gained by having them straight, which in general is the plan adopted. The body of the cart may be from 4 ft. 6 in. to 6 ft. 6 in. in length, and its width suited to the space between the naves of the wheels; the shafts may be 3½ by 6 in. deep at the axletree—which is of malleable iron—and reduced to 4 in. in depth at the back and front end of the body; they may be then wrought down to 3 in. in diameter at their points. Across the back end of the cart is placed a bar, 4 in. wide by 3 in. in depth, which is bolted down through the shafts; and also one of similar dimensions on the front part of the body, which should project at least 1 ft. out past each side of the cart, and a bow of 1 in, round iron, 3 ft. wide and standing 2½ ft. high, is placed in its centre.

as shown in the section (fig. 7), and bolted down through the bottom and front cross-bar of the conveyance, which prevents the load from coming in contact with the horse. A piece of wood 2 in. thick is fitted under the transverse bottom bars parallel with the shafts, and resting on the centre of the axletree, the end of which may be observed by referring to fig. 7. This cart may be utilized, when not in use conveying timber, for carting materials of other descriptions, as the two cross-bars can be removed, and sides and ends slipped on to the body, which should be fitted up for their reception.

The tackle required by the wood carter consists of a short crosscut saw, a light axe, a crowbar, a pair of light blocks with stout rope, and also tail drawing chains as well as chains for securing his load. Thus provided, if he be by himself when carting timber, and he observes a standing tree with a suitable limb projecting from it, he will in all likelihood draw his cart and the wood that is to be removed under it, and attach his blocks thereto and hoist the logs on to his cart; otherwise he will probably unyoke his horse and place the points of the shafts near the butt end, and at an obtuse angle to the side of the tree he intends to load; he then removes the bow from its place—of course, replacing it when required—and fixes the end of a chain to the end of the log, giving it a few turns round it; the opposite end is passed over to the back end of the cart and the horse yoked to it; the horse being accustomed to the work, at the word of command moves forward, and by a stiff and steady pull the butt end is rolled up the shafts and drawn back to its proper place, the carter meanwhile assisting by levering or otherwise guiding the tree to that position, where it is at once secured. A similar performance is gone through with the log for the opposite side, but he will likely have to allow the end of it to roll or be drawn up a certain distance on the point of the tree which is already on the cart, the end of which will be probably resting on the ground. These logs are supposed to be in long lengths thus necessitating their points being put forward, and in many cases they will reach past the head of the horse; but if they are of moderate length, the butt ends may be placed in that position.

Another method for loading is to cant the cart on to its side, and roll the tree on to the wheel and close up to the body of the cart where it is chained, the horse is then yoked to the upper wheel and is drawn back to its proper position. Or one wheel may be taken off and laid flat on the ground, placing the end of the axle on the centre of the nave; the log, or logs, are rolled up by manual or horse power, and secured to the opposite wheel until the cart is raised by means of levering and lifting to its original state, when they can be properly arranged. Lighter pieces may be loaded by placing one end on the front bar and the cart moved forward under it until the piece is about balanced, when the end is brought down on to the cart; it may be then, by the aid of a handspike, worked back to its required position.

The janker, which is represented in fig. 8, is the most convenient machine for removing large logs, and is commonly used in conjunction with the cart for shifting heavy lengths which may be impracticable for loading on to the wagon or cart; but one of light construction will be found useful on most estates in transferring pieces of timber short distances by hand, or assisted by horse power where convenient.

The janker consists of a pair of high road wheels with a curved iron axle (see fig. 9), the points of which project straight out instead of drooping slightly downwards, as they generally do in other conveyances; the reason for this is that the pole is more easily raised and lowered. The pole may be from 10 to 12 ft. in length by 4 in. by 5 in. in depth, and tapering to 3 in. square at the point, where it is mounted with iron, having a loop and ring in its end; the opposite end is banded to the axletree by a strong iron plate, which runs from 2 to 3 ft. back; in the front of this band, which passes round the axle, projects a round iron hook, to which is fixed a chain when raising the tree and where it rests when in transit. The pole is also strengthened by the side stays that are shown in the sketch. The mode of using it is by running it back with a wheel on each side of the log, round which is fastened a chain at a point where the end under the pole will remain the heaviest; that is, if it is to be taken in tow by a cart, the pole of the janker is then raised up, which will lower the axle close to the tree; the chain is then passed on to the hook in front of the axle, and by means of a rope or chain fixed to the ring on the point of the pole, it is drawn down either by manual or horse power, and bound closely to the log; if its end projects past the pole a chain must be fixed round it, and fastened either to the axle of the cart, or the end of the chain may be passed up through its bottom and the end of the log raised close under it and the chain tightened and secured to a piece of wood laid across the bottom of the cart.

(*To be continued.*)

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**Golden Oak.—Why is this tree (*Quercus pedunculata concordia*) not oftener seen than it is? This summer, in the neighbourhood of Edinburgh, it has been most effective, not white, like the variegated Acer, but a fine rich golden colour about which no complaint can be made. Lovers of hardy pictorial trees should make a note of this, also of the Golden Elder, a really good thing, having the merit of being highly ornamental, very easily propagated, and therefore inexpensive, and with a constitution permitting of its being planted almost anywhere.—*Garden.***

# On Planting Arable Lands.

### By W. BAXTER SMITH.

THERE is an excellent paper in the November number of the *Journal of Forestry* (page 428), by Mr. William Lipscombe, of Wakefield, on planting trees in stiff undrained clay land which has been unprofitable under arable cultivation, and he expresses disappointment that his previous papers on this important subject should not have been followed up in the *Journal* by other writers. It must, no doubt, be somewhat discouraging to Mr. Lipscombe and other good practical writers to find so little response to their instructive papers, but they may rest assured that they are fully appreciated by many readers of the *Journal* who would be sorry to miss their names from its pages.

There must be many practical foresters well able to supply valuable information, who would find very little trouble in giving, now and then, short details of their doings, and the nature of the subjects they had to deal with. If practical men, living in different districts, could be induced to go heartily into this useful work, how helpful it would be to young foresters at the commencement of their career. What they greatly need is the practical experience which they are only beginning to acquire, and which can only be obtained from older men who have been longer engaged in the work than themselves. A young man entering on the duties of his first situation is brought at once to face practical work requiring prompt attention, and however well he may have been trained as a skilful assistant, he has now to direct and regulate the work himself, and such practical papers as those I have referred to put him in possession of many useful suggestions to help him in his proceedings. Ordinary common sense (the possession of which is essential) will prevent his running haphazard into work he does not thoroughly understand, and he will consider carefully if the local conditions he has to deal with are identical with those brought under his notice, or sufficiently so to make him look with confidence for success in his own operations.

Adverting to stiff undrained clays referred to by Mr. Lipscombe, I would say, avoid planting such land unless you are prepared for at least partial disappointment and willing to risk total failure. My own experience would deter me from expensive attempts to improve such land by drainage, and on the heavy London clay I have seen deep and frequent drains prove very ineffectual, and open furrow drains as much needed as before to carry off the surface water. I think Mr. Tait, of Owston Park, is right in recommending rounded lands or ridges with deep furrows, and to dispense altogether with closed drains, and save the £5 or £6 per acre they would cost. The summer fallow, previous to planting, also recommended by Mr. Tait, ought, if well done, to save after expense, by destroying much of the rank herbage which generally grows on such land, and is very injurious to newly planted trees; it would also make the surface soil more friable and every way in better condition to give the young trees a kindly start.

The trees most likely to succeed in stiff wet clay are very limited in number. The oak must occupy the first place in the list, and I would follow with the elm, sycamore, black Italian poplar, and hornbeam, and the only coniferous trees I would name are the silver fir, and the Austrian and Corsican pines; these I would recommend to be planted in a belt along the margin of the plantation, intermixed with black Italian poplars, which would form an excellent shelter to the plantation and at the same time add greatly to the beauty of its outskirts. If it were desired to give a trial to other coniferous trees I would recommend *Thuja Loibii* and *Picea Nordmanniana*, both most beautiful hardy trees and on heavy soil to succeed.

I would hope that the marginal belt I have proposed might make it unnecessary to plant fir trees as nurses in the interior of the plantation; but if this is necessary the usual kinds must be resorted to and selected in proportions most likely to meet with a ready local sale when they are thinned on their attaining a size suitable for posts and railings. A wet stiff clay is very far from being a congenial soil for them, but the Scotch fir is wonderfully accommodating when planted in low situations; and although some of our northern friends declare it will not thrive in the south, there are, for all that, many fine specimens to be seen not very far from the metropolis, and it frequently grows on rich soil to a large size, and assumes a more luxuriant habit than it does on its native hills in Scotland, although I think that by so doing it loses a great deal of its picturesque beauty. Its value as a timber tree is generally inferior in such situations, owing probably to its quicker growth and luxuriant habit; but this is not the case in Surrey or Hampshire, where it finds congenial soil, and maintains its character for giving an earlier return of useful timber than any other tree of its kind. I would ask those of our northern arboriculturists who are inclined to doubt this to visit the beautiful and extensive pine woods on the property of Mrs. Anderson, of Waverley, about two miles from Farnham, in Surrey, which I had an opportunity of walking through last summer.

The pine woods of Waverley grow on undulating and somewhat hilly ground and cover a large area. Many of the trees in the oldest plantations are from 50 to 70 ft. in height, and stand from 6 to 8 ft. apart, having tall straight stems crowned with healthy foliage. Some of the pines in these woods measured from 18 to 24 in. in diameter, and young trees are springing up everywhere on the moorland, which extends for several miles in this neighbourhood, and to which the winged seeds are carried by the wind from the old woods, or they may be partly sown by the numerous rooks who are known to carry them long distances in their daily flights—for what purpose, it is difficult to conjecture, unless we believe the reports of the country people, who declare they have seen these knowing birds burying the cones in the soil, as if they wished to secure for their successors new woods for their rookeries.

The beautiful property of Waverley is rendered interesting in other respects by the picturesque ruins of the Cistercian Abbey, founded by William Giffard, Bishop of Winchester, in the year 1128, and by the many fine old oaks to be seen in its neighbourhood, one of which is specially interesting both on account of its great age and size. It is strange that this venerable tree should have escaped the notice of Loudon, in his *Arboretum Britannicum;* it is mentioned in an old charter as marking one of the bounds of the abbey possessions, and it still stands as therein described, on the banks of the River Wey, at the village of Tilford, about a mile from the ruins of the abbey. The charter is dated 1150, about 800 years ago; but as this oak was then noted as a landmark we may safely call it 1,000 years old at the least. It is now about 90 ft. high, and its immense branches extend 50 ft. on every side, and one of them, blown down in a gale of wind a few years since, contained two loads of timber. The trunk measures 26 ft. in circumference about 6 ft. from the ground, and its dimensions are therefore considerably less than the Cowthorpe Oak and some other well-known trees, but it is in a very healthy state and carries abundant foliage on its highest branches, although the trunk is rapidly getting hollow. This year it produced a large crop of acorns.

My readers will, I trust, pardon me for diverging so far from the subject of this paper, and with their kind permission I will now return to it.

Mr. Lipscombe regrets that his remarks in his former paper did not elicit information from nurserymen as to contract prices for planting operations in different parts of the kingdom, and as I have had a long experience in such work, if he will allow me I will give him my opinion on the subject. A nurseryman can have no difficulty in giving a definite contract price for planting, provided the obligation to uphold is excluded. If he chooses to undertake upholding he may of course do so by increasing his price, but he does so at a risk to himself, and cannot make his employer sure of success after all. Neither of them can foresee the issue. If the trees have not done well at the end of two years the nurseryman must replace them; but in most cases the cause of failure will not be careless planting, but will be found in local conditions of soil or climate which may always prevent the healthy growth of the trees, and the nurseryman can only replace the deaths with trees doomed to the same fate. The nurseryman must necessarily make an extra charge to lessen his risk, and if the planting is successful he gains an extra profit, but if it is unsuccessful the proprietor of the ground planted has derived no benefit from the obligation to uphold which has failed to secure what he wanted.

That an obligation of this kind will make a conscientious nurseryman more careful to fulfil his contract I do not believe. It is both his duty and his interest to do his best to make his work successful; and not only so, but he will take a personal interest in it, and will be ready, in the event of a remediable failure, to deal liberally with his employer by giving him upholding plants on the lowest terms, if they should be required. This is surely a more agreeable plan for both parties than burdening the nurseryman with an indefinite obligation, which after all will not give any certain security of ultimate success. In large contracts of from 500 to 1,000 acres, where the whole work cannot be finished in one planting season, either from limited time or unfavourable weather, the contractor might be bound to leave the proper number of living plants on the ground at the end of the second year; and if failures occur afterwards, and "beating up" is required, it is, I think, better that the proprietor should do it himself, employing his own labourers under the superintendence of his forester, or, if necessary, a properly qualified man might be got from the nurseryman to take charge of the work.

In looking through the pages of the *Journal of Forestry* and the Transactions of the Scottish Arboricultural Society I find the estimates given by different writers for planting land with young trees vary from £2 10s. to £10 per acre; but the last figure is much too high, and must have been caused by some unusual difficulty in getting the work done, or, perhaps, by the addition of some high-priced ornamental trees.

On land where no particular obstacle exists to retard the work, and on which fir trees are planted 4 ft. apart and hardwood trees at 12 ft., the charge for plants and planting would be about £4 per acre, and £3 if planted with firs alone; but if extra-sized plants are required, there will be a proportionate increase in the cost. These estimates suppose that the plants used have all been transplanted in nursery lines and properly grown for removal.

Mr. Lipscombe objects to the reports which appear from time to time of the profitable results from successful plantations, because in his own case they have not been fully realized; but I think it is very right, when it can be done, to put successful results before young foresters, to encourage them to do their best to equal them. A high aim is a good spur to progress, and I think it is a very fortunate thing that we have authentic examples of profitable returns from plantations to counteract the discouraging effect of cases which have fallen short of such a high standard. A sensible forester will not take for granted that all he reads will apply to his own case, but will strike a fair balance between good and bad results, and will not allow the latter to lessen his endeavours to attain to the former.

What has already been done may be done again. Scotch fir alone has been shown to have yielded a profit equal to a yearly rental of from 20s. to 40s. per acre on poor land worth less than 2s. 6d. per acre before it was planted. These figures cover a wide margin, and if the value of such land could be raised to only 10s. per acre, surely that ought to be sufficient encouragement to satisfy any one that planting trees is a good and safe investment.

Mr. Lipscombe concludes his interesting paper by stating emphatically his conviction that many nurserymen send out deteriorated varieties of Scotch fir. Now one of the great benefits we derive from the *Journal of Forestry* is its impartial allowance of free discussion in its pages, subject, of course, to the rules of courtesy; and Mr. Lipscombe, I feel assured, will permit me to say that on this point I must disagree with him; but to be brief, I will only give two reasons at present for doing so. First, the question has been frequently discussed at the meetings of the Scottish Arboricultural Society, and men of high standing as practical foresters have come to different conclusions gathered from their practical observation. Some of them have stated that they have found inferior varieties in plantations raised from seed procured in the native Scotch forests, and which must have suffered deterioration from causes to which even the natural excellence of their lineage had to succumb: and that in cases where the conditions were more favourable they have known plants raised from both native and foreign seed produce trees of equal value. I am, therefore, inclined to believe that a great deal depends on the individual character of the trees from which the seed is gathered; and although I would prefer native Highland seed, if gathered from healthy trees, I would not object to seed taken from Continental forests if the same precautions were carefully observed in collecting the cones from vigorous trees. All our large nurserymen are most anxious to procure their seed from healthy trees in this country, and make careful arrangements for that purpose; and I have reason to believe that none of them would use seed that was known to have been taken from stunted, unhealthy plantations.

It would add to the increasing interest taken in the articles that appear monthly in the *Journal of Forestry* if more of our foresters would give us their experience on such subjects as I have mentioned in this paper, and it is by bringing in this way different opinions together that a true solution of doubtful questions is arrived at.

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## THE SCOTCH PIT-PROP TRADE.

Our useful contemporary, the *Timber Trades Journal*, states that it is unable to report a satisfactory trade in home-grown pit-props, in which there was formerly a good business done, but which, like some other industries, has almost succumbed to the severity of the foreign competition. The principal market for the produce of the Scotch forests was Newcastle, and there is probably more goes there still than to any other port; but at the present time it is with the greatest difficulty that sales of Scotch props can be made, excepting at those occasional periods of extraordinary activity at the collieries when anything in the shape of timber and props is eagerly sought for.

The preference for the Swedish and Norwegian props does not apparently originate with the colliery proprietors and managers; indeed, it is a fact that the Scotch are more durable, and more to be relied on for safety, than the "foreigners," but their weight is against them, and this quality—which, of course, for considerations of safety and durability is a good one—is counterbalanced by the ease with which the lighter foreign props can be moved, and on this account they are naturally preferred by the stonemen and shifters down the pits.

Home growers are in a great measure to blame for allowing the foreigners to get such a hold, for during the coal famine the rubbish that was sent in as props from the north was simply disgraceful. The result to-day is that to get cargoes placed very low prices have to be accepted, and in many cases return cargoes of coals are insisted upon.

Present wholesale prices for producers, where sales can be made, are:—

Commons, 2s. 6d. to 2s. 7½d. per 72 lineal ft.
Crowns, 4s. 10½d. to 5s. ,, ,,
Best larch, 1s. 4½d. to 1s. 6d. per cubic ft.
Short light do. 1s. to 1s. 3d. ,,

# Planting Undrained Clay Land.

By DAVID TAIT, Wood Manager, Owston Park, Doncaster.

If gentlemen who intend planting turn to any book on the subject, or to a calendar of forest operations, they will find, without fail, some such sentence as the following:—"Let the ground be well drained during the summer previous to planting; the drains should be 4 ft. deep and sloped well back on either side. Open drains are best," &c., &c.

Now this is orthodox forestry, and in theory is perfectly correct, and possibly in practice also in those very rare cases where the pecuniary aspect of affairs is of the remotest consideration. Any one, therefore, who values his reputation as a forester, had better keep in the old ruts and jog safely along on the tracks marked out by his predecessors; but, nevertheless, I propose to offer a few remarks from a different point of view. First, I will consider what draining means, and what such an operation costs; and secondly, what prospect of success there is for planting without draining.

What is draining? It certainly is not what has to pass muster for it in many cases previous to planting. The cutting of a few shallow surface drains about a foot or 18 in. deep is not drainage; they are simply gutters to carry off the surface water.

To thoroughly drain the land, the open drains require to be from 3 to 4 ft. deep and the same width at the top, tapering to 9 or 10 in. at the bottom, and these drains would have to be not wider than 24 ft. apart, and this would be something like 27 chains per acre. For cutting narrow 4 ft. drains on stiff clay land, a shilling per foot (in depth) per chain would be a moderate price, and would cost about £5 8s. per acre; but with double the quantity of soil to move, open drains will cost one-half more, or above £7 per acre.

In making these remarks I am endeavouring to follow out the subject opened by Mr. Lipscombe in last year's volume of this *Journal*, and again referred to by him in the last number of the present volume. The case of a landowner is supposed who has some of his strong clay land farms thrown on his hands, with no prospect of finding an agricultural tenant for them; and he is further supposed to be considering the advisability of planting them with forest trees, and the best method of proceeding to carry out such work.

Now I submit that the owner of clay land farms who is prepared to expend £7 per acre on drainage will greatly stand in his own light if he does not make a further exertion and lay out another £3 per acre on liming, and then go in either for corn growing or grass. It is not the owners of well-drained and well-manured land who have to fear American competition in corn or any other article, but the owners of poor undrained clay land, who do not see their way to any such expenditure as thorough drainage implies. True, Mr. Lipscombe in the last number of this *Journal* says his drainage only costs £4 10s. per acre, but in an article published in the November part last year he puts the cost of thorough drainage for agricultural purposes at from £6 to £8 per acre; and as I have remarked above, the cost of open drains must be considerably more. But even £4 10s. is too heavy an outlay for drainage in the circumstances we are considering. I do not, in these remarks, give any opinion as to whether planting poor clay land, for which there is at present no demand among agriculturists, is the best thing to do with it. There is always one strong consideration against extensive planting, viz., that the planter must, in the majority of cases, plant for the benefit of his successor. How far it would be profitable to plant outlying portions of poor clay land farms, laying down to grass those lying convenient to the homestead—for which smaller sized compact farms one might fairly hope to get as much rent as was previously obtained for double the quantity of arable land—is a question which might be worth consideration; but I merely hint at that, as I find I am digressing from the subject in hand.

The question we wish now to debate is, supposing a landowner has come to the resolution to plant his undrained strong clay land, can he get clear of this heavy drainage bill? My opinion is most decidedly that he can; and further, if he does not plant without draining, he may give up the idea of planting at all, as a means of getting out of the difficulty which besets him. The surface water would have to be got off by some shallow surface drains, or gutters, but anything further I would not advise.

The next and most important point is to choose the proper varieties of trees to plant; and I must here again refer to Mr. Lipscombe's article in your last issue. In it he says, "I would neither plant larch nor spruce as named by Mr. Tait," and as this is liable to give the impression that I recommended these varieties to be planted on undrained clay land as a permanent crop, I will just refer to what I did say in your January part of last year's volume. What I recommended to be planted was black Italian poplar, oak, birch, spruce, and larch; the latter two varieties to be cut in the earliest thinnings, and the birch to be taken next. The spruce I recommend for its peculiar suitableness as a nurse, and the larch for its peculiar usefulness in the early stages of its growth. That both will do well up to from thirty to thirty-six years old I have seen demonstrated over and over again. The ash I have not found do so well on undrained clay land as on some other varieties of wet soils—on damp peaty soils, for instance, it will do better than any other variety. Much the same may be said of the alder, which I have not found succeed so well as the birch on strong clay. The latter has also a peculiar recommendation, which in many cases is of great advantage to planters, viz., that it is perfectly rabbit proof. But the tree I most strongly recommend to planters is the black Italian poplar. When of small size it is of comparatively little value; it should, therefore, not be planted closer than it has room to attain to a good size. Anything over 14 in. in diameter sells readily, and even within the last two or three years, when most kinds of timber have been bad to sell, there has been a good demand for it. It not only grows, but thrives well on undrained clay land.

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TALL TREES.—An Edinburgh correspondent, writing to the *Gardener's Chronicle*, says:—In a village, over which the sun will one day perchance cast the shadow of the Forth Bridge, and filled with surprise at the thought of its elevation, I went to church, little expecting that my estimation of height was destined to be completely dwarfed. The text was, "The righteous shall flourish like a palm tree," and appropriate enough were the analogies which the grandiloquent speaker drew from its upward, undeviating, and inwardly increasing (endogenous) growth. But these were tame compared with the aspect the figure wore when the preacher assured his hearers that this tree sometimes reached the height of a thousand feet! "Where is the candidate from?" I inquired. "America," was the reply. He was *far* from home!

ROYAL TREE PLANTING IN EPPING FOREST.—On Saturday, the 16th October, their Royal Highnesses the Duke and Duchess of Connaught, accompanied by the Lord Mayor and Lady Mayoress and several members of the Corporation, proceeded to Epping Forest and planted two Norway spruces as memorials of the reclamation of Epping Forest.

TREE RECORD.—The largest and finest specimen of Oriental Plane that has come under my notice is growing on the lawn in front of Lord Bradford's mansion at Weston Park; it measures 18 ft. in circumference of stem at 5 ft. above the ground, and its massive spreading head is full 30 yds. in diameter.—G. B.

—— Let us not forget the splendid Plane which stands by the entrance to the South Kensington Museum—one of the finest of all London trees. It affords one of the coolest and shadiest of seats to be had in town on a broiling day.—F. W. B.

UNSEASONABLE FLOWERING.—The *Annandale Observer* of the 15th October states that an Elder tree, behind the Bank of Scotland, Annan, was then in blossom for the second time this year. So also is a Pear tree in the Post Office Garden, and an Apple tree at Langshaw.

# The Spanish or Sweet Chestnut.

(*Castanea vesca.*)

By A. J. BURROWS, Land Steward, &c., Pluckley, Kent.

This tree, like the oak, belongs to the natural order *Corylaceæ*. It has oblong lanceolate leaves, which are also accuminate and serrated. It is found growing on both the eastern and western sides of the continent of Asia, also in Northern Africa and in North America, as well as nearer home in France, Spain and Italy. Its habit of growth is greatly dependent upon the character of the soil in which it is placed. In the close plantation it often attains a great height, and grows clean and straight; while in more open situations it forms a handsome, spreading tree of large dimensions; and if the subsoil be rocky, the tree becomes a most picturesque object, being considerably twisted and contorted both in its trunk and branches.

A sandy loam may be said to be best adapted to the growth of the chestnut as timber; but it also flourishes upon poor gravelly soils and loams, though not on a strong, wet clay. In situations where it is fairly sheltered it attains a great size upon almost any dry-bottomed soil.

The sweet chestnut is also valuable as a coppice-wood, as both from its rapidity of growth, its freedom from sapwood and its flourishing upon rather poor sands, it forms one of the most remunerative of underwood crops. Many instances of its making from £45 to £50 per acre at ten years' growth have come under my own notice, and some in which eleven years' growth has exceeded £75 per acre.

Owing to the rapidity of this tree's growth upon suitable land and the great spread of its branches, the timber is very liable to ring-shake, a defect which seriously interferes with its use for beams and in other situations where it might be exposed to great strains, and where otherwise it might become a substitute for oak. Still the wood is found very serviceable for many purposes to which oak is generally applied, such as door-jambs, window-frames, gate and fencing posts, cart bodies and tables. It was at one time in request for sea-walling or embankment works. Upon some soils the Spanish chestnut deteriorates rapidly after the age of about threescore years.

The wood of the chestnut is of a brown colour, fairly hard and heavy, fine and clean in its grain, but withal rather porous. It has no distinct alburnum and no medullary rays ordinarily visible. Being very durable when constantly submerged, it is found serviceable for both piles and sluices, though even in such situations it lasts longer upon an oozy than upon a sandy bottom. For liquor casks it is unequalled, as it neither shrinks after being made up nor changes the colour of the wines put into it. Rapin, in "The Garden," refers to its employment in the following words:—

> "With close-grained chestnut-wood, of sovereign use
> For casking up the grape's most potent juice."

This timber was at one time employed as a substitute for mahogany in cabinet work, which it was made to resemble by rubbing it first with alum-water and afterwards applying with brushes decoctions made from logwood chips and Brazil wood. It was also found to be a fair substitute for holly in large and rough wood engravings.

The tree takes its name from Kastanea, a city of Pontus in Asia Minor, from whence it is supposed to have been brought to Europe by the Greeks about five centuries before Christ. Its appellation is very similar in all European languages. By some writers it is supposed to have been brought from Sardis to Italy by Tiberius Cæsar, from thence to France, and afterwards to Britain. Evelyn, however, considers that it is indigenous to Britain. That it has long been known in this country is proved by the record of the gift which Henry II. made to Flexly Abbey, and which consisted of the tithe of all his chestnuts in Dean Forest.

In growth the chestnut is not unlike the oak, but generally its form is rather more straggling. On account of its picturesqueness it occupies a very prominent place in the paintings of Salvator Rosa, who studied its various forms upon the mountains of Calabria.

Though this tree bears fruit abundantly in Spain, whence we obtain our principal supplies, and even in the southern parts of England, such as Devonshire, the ripening of such is uncertain in the south-east of this country, and still more so in higher latitudes. Much of the foreign seed which was formerly imported was kiln-dried, and hence its failure in the nursery. A duty of two shillings per bushel was at one time paid upon all brought into this country.

Transplanted chestnut trees fruit the best owing to their roots being more within the influence of the sun and the atmosphere. A loose and moist gravel or sand which is not absolutely wet is also found to be most favourable to fruit-bearing. The fruit of the chestnut was at one time in great request as food, and the bread made from the ground nuts was sweet, wholesome, and very strengthening. Ray tells us chestnuts were formerly eaten in Italy with orange or lemon-juice and sugar. And even at the present day prepared chestnuts are introduced as a luxury at the tables of the better classes in England,

and vended freely in the streets during the colder seasons of the year.

The growth of the chestnut from the stool is upon a suitable soil more rapid than that of most other underwoods. In a period of eight or nine years the poles often run up to heights between 30 and 40 ft., with diameters of from 4 to 6 in.

As an ornamental or park tree it is remarkable for the size and beauty of its foliage when it is young, for its stateliness when it approaches maturity, and for its venerable appearance when it becomes old. Its effect during the latter part of the summer, when its spiked clusters are conspicuous among the oaks by which it is generally surrounded, is very marked. The same may be said of its autumnal effect, when the leaves assume a bright yellow tinge.

Though oak timber has often been mistaken for chestnut in old structures, there is no doubt that much of the latter was formerly used in large buildings in London, and throughout England generally, as well as upon the continent. That such was the case is abundantly shown in the works of the late Welby Pugin, who examined the timbers of such structures very carefully, and wrote the word "chestnut" upon them in many of his illustrations.

Numerous instances of the great durability of chestnut timber are quoted by Miller. In one case, gate posts of chestnut and of oak were put down at the same time upon a property at Wellington in Somersetshire. This was before 1745. In 1763 repairs were found necessary; the oak-posts had decayed, but the chestnut were considered good enough to be used again, and they were sound in 1788 when the second lot of oak-posts were gone. A gate post, 13 in. square, and cut out of a chestnut branch, was put down in 1726, and at the end of 52 years it was found to be sound enough to use as a falling post.

As instances of the sizes attained by chestnuts upon favourable soils we may mention the celebrated Tortworth Chestnut upon the property of Lord Ducie, in Gloucestershire, growing on a soil which may be described as a loamy clay. According to Evelyn this tree was called "The great chestnut of Tortworth" in the time of King Stephen (1135). Strutt gives its measurement in 1820 at 5 ft. from the ground as 52 ft. in circumference, and its cubical contents as 1,965 ft.

One of the largest trees upon record is the famous chestnut which grew upon Mount Etna, and was measured by Brydone in 1770, who states that it was then 204 ft. in circumference! But later writers have supposed that the decaying trunks of several trees growing near each other are included in this measurement. However, it is certain that a century earlier the tree measured 76 ft. round not far from the ground. If the larger circumference given by Brydone be correct and it has been repeatedly stated that beneath the surface of the ground the ring was found to be complete, this may be the tree spoken of by Massa, the hollow of which would contain 300 sheep or 30 people on horseback.

The sweet chestnut may be freely propagated from seeds sown as they fall from the trees or stored until the beginning of March. But the crop is too often lost for the want of sufficient attention in the selection, or from too little care being taken to keep away mice and other pests of the nursery. Evelyn recommends planting in autumn with the husks on, and these he calls "providential integuments." He further says of spring planting:—"Let the nuts be first spread to sweat, then cover them with sand; a month being past, plunge them into water, reject the swimmers; being dried for thirty days more, sand them again, and then to the water ordeal as before. Being thus treated till the beginning of spring, set them as you would do beans."

A common practice is to draw drills with a hoe 3 or 4 in. wide and from 15 to 18 in. apart, and sow in these nuts rather thickly, afterwards transplanting the seedlings; or else to draw the drills narrow, and from 10 to 12 in. apart, putting in the seeds at about 3 in. from each other in the rows. Thus they may remain for two years. If sown towards the end of October the plants will rise early in May; and where ample space is given they need not be transplanted until the end of the second year, when the tap-roots should be cut back rather closely. Chestnut plants should also be kept fairly but not too closely pruned while in the nursery.

After the autumn planting of chestnuts it is a good plan to cover the ground with tan or some other substance to keep out frosts. Leaves are useful, but with such a covering it is difficult to observe and put an end to the depredations of the small rodents.

When the plants stand in lines, an occasional undercutting is to be recommended in preference to too frequent transplanting. After its earlier stages no tree receives a greater check from transplanting than does the chestnut. This operation is supposed to throw it back for at least two years. This fact has recently received strong confirmation from the experience of extensive planters in the State of Manitoba.

*Castanea pumila* is a dwarf species of chestnut found in the southern states of North America. It is also called the "Dwarf Virginia Chestnut" and the "Chinquapine." It is a hardy tree and very prolific. It is not common in England, though it was introduced to this country by the Duchess of Beaufort towards the end of the 17th century. Its stem is of a darker colour than the common chestnut, and it forks out very considerably near the top. The leaves are oval, acutely serrated, and rather hoary underneath. It blossoms in the spring, but does not seed freely in this country.

There are several other varieties of the chestnut, but these demand no lengthened notice. Among them are *C. variegata,* with yellow and white streaks upon the leaves; *C. Americana,* a variety with broader leaves than the common chestnut; and others called *C. glabra, C. glauca,* and *C. aspenifolia,* whose names sufficiently indicate their characteristics. The true sorts can be secured only by grafting, as the produce from the nuts of these cannot be depended upon.

In France varieties are produced by inarching. These are cultivated for the sake of their fruits, which are large, sweet, farinaceous nuts, yielding a rich aromatic odour after roasting.

## THE TULIP-TREE.

I AM anxious to place before your readers a few remarks recently supplied me, in a most kind and courteous manner, by Mr. Freeman, Caroll, Baltimore, in the United States, regarding his own experience in the cultivation of the tulip-tree. Mr. Freeman states that some time ago, owing to the death of several young tulip-trees, he planted others of the same kind in the month of April, and when the leaves were about two-thirds grown, about twenty-four trees were planted, and all survived. These plants, about 6 ft. high, were taken from a bed of seedlings in the woods, whilst the dead ones had been procured from a nursery, and were considered to be very fine plants in all respects when planted the previous autumn. Mr. Freeman had just succeeded a gentleman in the position he (Mr. Freeman) occupied—very much more experienced and older than himself,—who had finished the autumnal planting, and he (Mr. F.) was assisted by an old man who had been in the place for years as a labourer. The latter told Mr. F. it would be utterly useless to try and remove the trees. His predecessor had often attempted to do so, but invariably failed. He admitted, however (a most important admission), that their removal had always taken place in the autumn, or the more expressive phrase "fall," as generally used in America. Mr. F. cut back the head, and took off all long leaves, and planted them with merely ordinary care. The very best results followed—a fine growth was obtained the first summer. He has seen hundreds die when planted in the "fall," but not one when planted properly in the spring. He considers that, owing to the spongy nature of the roots, they will not bear mutilation unless when active, which also obtains with magnolias. The plants removed by Mr. F. had not a particle of soil about their roots. He counsels me to use care not to let the roots become dry when out of the ground. I am so satisfied that Mr. Freeman's advice is sound and good, that I will take care in future never to plant a single tulip-tree before April. I should deserve to die myself if I committed such a mistake as to plant these trees again in the autumn. I would beg, through your journal, to thank most cordially and respectfully Mr. Freeman for his valuable advice.—J. COLEBROOK in *Gardener's Chronicle.*

# The Causes of the Larch Disease.

By JAMES RENTON, Overseer, Cleghorn, Lanark, N.B.

I have not regularly attended the meetings of the Scottish Arboricultural Society for a number of years, but I remember about four years ago, when I happened to drop into the annual general meeting, a very interesting discussion was being carried on about the causes of the larch disease. At the time I refer to there seemed to be a good many different opinions amongst practical foresters and others as to what was the real or primary cause of larch disease, or in other words, larch failure. This year I was again present at the Society's general meeting, held in October last, when the same subject was introduced for discussion. I felt a little disappointed when I found the same diversity of opinion amongst those who took a prominent part in the discussion that I noticed four years ago.

I think I am correct, perhaps, when I say that those who differ in opinion on this subject may be divided into two classes. The one attributes it to late and early frosts, and the other to the larch bug, and here we stick. Some say it is the former, and others hold that the latter is the real or primary cause of larch disease; nothing, however, so far as I know, has been done to prove definitely which of the two maladies is the more destructive to our favourite pine. Now, is it not possible that the one may be, or is a consequence of the other?

The Scottish Arboricultural Society is an association that many people interested in arboriculture, including a number of foresters and landed proprietors, expect to receive a good deal of sound, practical, and scientific benefit from, but I am not sure if the Society is serving this purpose at the present day, from the fact that many of the members are not doing their duty towards the Society in furthering its objects as they ought to do. If we were, I think all of us, including the leading members of the Society, would be more observant in all matters connected with arboriculture than we have apparently been hitherto.

I also think we should be more communicative, through the medium of the *Journal of Forestry*, and above all things go as much as possible to the root of every little incident, thereby helping ourselves to establish a clear judgment upon sound facts, and substantial argument; all this in my humble opinion would go a long way to further our profession, and it would possibly aid us in getting more quickly at the why and the wherefore. I am hopeful the day is not far distant when we shall be able to meet and declare in the Royal Botanic Gardens at Edinburgh what is the real and true cause of larch disease. So soon as we decide on this we shall be able to go about the remedy, and perhaps we shall then too be more careful to plant larch only on such soils as are really suitable for the healthy and permanent growth of the tree.

For my own part I admit that I dread "Jack Frost" more than the "bug" theory, although I am prepared to admit of the bug being hurtful to some extent; but if foresters and others would only be more careful about selecting the proper kinds of soils to plant larch upon, the results of their labours would be less disappointing to themselves and much more satisfactory to their employers.

I would then urge upon all men in charge of plantations, but more especially upon the younger members of the craft, who may be about to be left to think and act for themselves, to examine carefully the kind of soils they have decided to plant upon. And here I would remind them not to plant larch upon thin moorish ground, nor upon cold hilly land, nor upon damp swampy land, not even although it may have been well drained, for I hold that drains never can altogether change the inherent quality this latter class of ground seems to possess for attracting late and early frosts, which is so hurtful to the buds and foliage of the larch. Without hinting more upon this subject at present, I may just be permitted to state that I find in this part of the country larch trees thriving admirably upon land consisting of good loam, with an open or porous subsoil, the surface of the ground having a sloping aspect with a northern exposure.

Before finishing my remarks I almost feel inclined to throw out a suggestion for the consideration of the Council of the Scottish Arboricultural Society; it is as follows:—That the Society should at once take steps with a view to come to some definite understanding as to what is the true cause of larch disease, and, in order to facilitate the inquir y, I would further and respectfully suggest that a thoroughly practical intelligent man of noted arboricultural accomplishments be engaged by the Society to go all over Scotland, and to visit various estates in different counties, and in company with the several foresters examine all young larch plantations whether mixed or otherwise, and select different portions or places in each plantation to be examined once a month by the estate forester, and once every two months by the Society's inspector, both being careful to record every noticeable change which they observed on larch, and, if possible, to state the cause thereof.

The Society's inspector, in making his first visit to each plantation, would also be particular in noting every peculiarity in connection with sites of plantations, including geological formations, quality of soils and subsoils, elevations, and points of exposure; he would further be required to collect from the foresters the results of their observations, which he would, along with his own, prepare for publication either in the *Journal of Forestry,* or in the "Transactions" of the Society.

Could the Society but see its way to carry out my suggestions, I think many would agree that this was a step in the right direction towards supplying members with information sufficiently reliable to form a positive opinion as to what is the true cause of the disease that destroys the larch plantations.

The Society, which has already done much good by making occasional excursions to different parts of the country, ought to be more and more encouraged, and if additional funds were required to enable it to undertake more work I would suggest that a special appeal be made to landed proprietors who, I feel sure, would sympathize and also respond to the call.

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WOODS FOR COFFINS.—Large sums are spent by the wealthy classes of the Chinese on certain rare and valuable kinds of wood for coffins. The demand for this purpose comes from Yunnan and the more southerly provinces, to the more northerly ones. An English missionary travelling from Shanghai to Bhamo, met the governor of a province on his way to Pekin, accompanied by trains of horses carrying planks of wood to be presented to his friends to make cffins. The woods used are of good character, rather soft, very fragrant, while some possess a soft and silky grain. In price they range from a few pounds to as high as 700 dols. per coffin, a coffin for a mandarin being reported as costing 3,000 dols. One of the most valuable woods thus utilized is the Nam Mu, growing in Yunnan, a tall tree with a stem straight and clear, bearing a general appearance to the wood-oil trees of Burmah; it probably belongs to the family of *Laurineæ*. At the Paris Exposition there were exhibited fragrant woods from Tavoy and Mergai, of the genus *Cinnamomum,* which high authorities thought to be similar to the coffin woods of the Chinese, while again they were thought by others to resemble the Nepal camphorwood of Bengal and Assam (*Cinnamomum glanduli ferum*).

EUCALYPTUS AT CHISWICK.—Visitors to the Royal Horticultural Society's Gardens, at Chiswick, will be much interested in a collection of Eucalyptus which Mr. Barrow has planted out in one of the new beds on the south side of the garden, as they afford a convenient study for those desirous of becoming acquainted with the characters of the different species. One has quite rounded, stout, rigid leaves, not unlike in appearance those of a Dutch honeysuckle, and with a more horizontal growth than in the case of *E. globulus*, and the young shoots are handsomely tinted with brown. *E. undulata* is a very handsome type. While the leaves of some are quite green, but small and most elegant, others are so richly glaucus as to appear frosted with silver. From this bed one might make a selection of trees of no ordinary character that would grow out of doors in summer, but few will be hardy enough to stand out in winter.—*Gardener's Chronicle.*

# Sir Walter Scott as a Forester.

By SAMUEL NEIL, Edinburgh.

Francis Quarles, in his quaint and once very popular "Emblems," has written in terse verse this great truth,—

> "He that delights to plant and set,
> Makes after ages in his debt;"

and Sir Walter Scott humorously expressed the same truth when he made the old Laird of Dumbiedykes, in the *Heart of Midlothian*, advise his "tall, gawky, silly-looking boy" thus:—"Jack, when ye hae naething else to do ye may be aye sticking in a tree; it will be growing, Jack, when ye're sleeping." To this passage the great novelist adds the following note:—"The author has been flattered by the assurance that this *naïve* mode of recommending arboriculture (which was actually delivered in these very words by a Highland Laird, while on his death-bed, to his son) had so much weight with a Scottish Earl as to lead to his planting a large tract of country." A word to the wise is sufficient; a word from the wise is efficient. On the topic of forestry, and the policy and patriotism of timber-growing, Sir Walter Scott's word is a wise and an authoritative one. He was not only a theorist in arboriculture or an enthusiast; he was a practical realizer of what other people regarded only as dreams. Example is better than precept, but when both are combined they should be irresistible. In Sir Walter Scott both are seen and given. Abbotsford is not only "a romance in stone and lime," it is a veritable poem of woodland beauty created by the genius and persistency of a master spirit.

It has long been characteristic of the Scottish people that they like to have a piece of land of their own; and hence whenever Scotsmen are rather more fortunate than their neighbours they display its results by the gratification of this proprietory instinct. As J. G. Lockhart, in "Peter's Letters to his Kinsfolk," says, "They purchase land and then take their place in the great body of British gentry, that most enviable of all human conditions." In 1811, when he had reached the ripe age of forty, Scott took the first step towards becoming a Scottish Laird, when he purchased a hundred acres of land on the banks of the Tweed, near Melrose. There he added to his titles of Bard and Sheriff, that of Landlord, and there he betook himself to "the planting of waste lands." In an article founded on "The Forester's Guide and Profitable Planter," by Robert Monteath, published in the *Quarterly Review*, October, 1827, he claims for himself some knowledge of the subject "from sixteen years' undeviating attention to the rearing of young plantations of considerable extent upon lands which may be in general termed waste or unimproved." We know too, from a paper of his published in 1828, Sir Walter Scott thought that "amidst the various sources of amusement which a country residence offers to its proprietor, the improvement of the appearance of the house and adjacent demesne will ever hold a very high place."

The land which Scott purchased in 1811 had formed a portion of the ancient "Coed Celyddon"—*Nemus Caledonis*, or "Wood of Caledon." This extensive tract of woodland, which in more modern times came to be called "The Forest," and is so immortalized in history and song, occupied the hill and valley stretches of the south of Scotland, from Cadzow near Hamilton, down to, if not across the banks of the Tweed—Tweed Shaws forming as it were the centre of the district. Scott's first wish was to buy Darnick Tower and the plot of ground which surrounded it. This he could not obtain. But one of the heiresses of Melrose, who had married a parochial schoolmaster, had found it necessary to sell a woodland tract to Dr. Douglas, of Galashiels, who again disposed of it to Walter Scott. The price paid first was £4,000. There was a low-built, one-story house standing in a hollow, amidst scenery bleak and bare, boasting no trace of natural beauty. The name of the property was singularly suggestive of the very dreary appearance of the place. It was called Cartley, or more properly "Clarty Hole." *Clarty*, in the expressive language of Scotland, signifies *dirty*, but the dirt to which it refers is a tenacious, oleaginous, pulpy mud; and of that the soil of Scott's new property chiefly consisted.

"And far beneath in lustre wan
Old Melros' rose and fair Tweed ran."

This was the earliest movement towards the realization of the territorial dream of founding a Border Family of Scotts, which might take its place among the venerated gentry of the land he loved; and seizing with a poet's grand conceptive faculty on a tradition still hanging about the district, that the celebrated Abbots of Melrose, in the time of their glory, were in the habit of crossing the river by a ford near by, he glorified *Clarty Hole* with the new and now enduring name of Abbotsford. Then followed other purchases: Keeside was bought for £4,100, the Out-field of Toftfield for £6,000, Toftfield itself for £10,000, Abbotslea for £3,000, Langside Field for £500, Shearing Flat for £3,500, Broomiless for £4,200, Short Acres and Scrab-tree Park for

£700, and a few other small fields and farms as they fell in and could be added. Well might we say now of Clarty Hole what Snout said of Bottom in *A Midsummer Night's Dream*, "O Bottom, thou art changed. What do I see on thee?" and again exclaim with Quince, "Bless thee, Bottom, bless thee, thou art translated!" since Clarty Hole is Abbotsford.

The transformation effected was no mere phantasmagoria, nor pantomimic flash of unreality, striking, dazzling, but transient as it is glittering. No; beginning on that barren mud-stretch, with its small farmhouse having a kaleyard on one side, and a barn on the other, with a rickle of labourers' huts round about it, "The Wizard of the North," by the marvellous prestidigitation of genius made old things new, and made that upland of the Tweed worthy of being the "local habitation" of the greatest poet and novelist of his time, and the name he gave it. Abbotsford is situated on the northern slope of ground which rises to a considerable height from the bank of the River Tweed, which makes a beautiful sweep round the declivity on which the house is situated. The building is castellated both in proportions and appearance, and the effect of the whole, though irregular and fantastic in parts, is striking and magnificent. The great gate is lofty and commanding, being a copy of the gate of Linlithgow Palace. When the mansion comes full into view its projecting eaves, fantastic gables, curious chimneys, ornamental windows, outjutting balconies, singular turrets, and all the strange grandeur of its masonry, set as it is in a square frontage of charming green interspersed with rosaries and flower-beds, impart a feeling of magnitude, importance, and luxury, which the interior deepens and increases. But we dare not talk of that interior, with its roof from Roslin chapel, its fire-place from Melrose, its walls covered in the wonderfully carved oak from Holyrood Palace and the Abbey of Dumfermline, its postern from "The Heart of Midlothian," its attractive study, its rare library, its cedar-fitted drawing-room, within sound of the ripple of the rhyme-rich river, its armoury, its hall, and the thousand-and-one curiosities of art and history collected and comprised within it. It is built at the base of a steep slope, and at the head of a gentle rise which declines gradually to the river's edge. Looking from the front the eye glances along a fine fertile tract of land, behind which lies the district of which the Leader and the Gala form the boundaries. To the westward lies the peninsula stretch hemmed in by the Gala and the Tweed, while in the distance the tops of the Ettrick hills attract the roving eye. The Allan, famous in song, pours its swift brattling waters into the Tweed, and the scenery of "The Monastery" is before one's gaze—the home of the Glendinnings and the lands of Glenderry. There the hills rise abruptly over a little glen, and the grey rock juts out from the greenwood which overhangs it, and above that there rises the mountain in purple majesty, its dark, rich hue contrasting beautifully with the thickets of oak and birch, the mountain-ashes and thorns, the alders and quivering aspens which chequer and vary its shelving sides. Amid the woods and glens, which gratify and gladden the spectator, the great magician of romance has wandered with dibble, pruning-hook, or axe, and the benches and bowers which have been formed in the woodland winding walks, and beside the water-falls, and where the ravine affords a scene of awe or grandeur, are there because a poet's keen and appreciative eye foresaw the beauty and the magnificence which the scene would possess when he arranged and planned the planting of those ranges of trees. Round Couldside Loch, and down the rivulet of the Huntly Burn, as it wimples through the Rhymers' Glen, Scott planted finely laid out young plantations, and enriched the pathway, beside which

"The stream the same for ever flows,
Soft gliding through the leafy brake,
From Couldside's dark unfathomed lake,"

with well-chosen trees and splendid shrubbery. And the mighty minstrel loved it so. "My heart clings to the place I have created," said he; "there is scarce a tree on it that does not owe its being to me." Surely, if any one wishes to see proof of Scott's skill as an arboriculturist, he has only to betake himself to Abbotsford, and the whole district will cry out *si monumentum quaeris circumspice.*

He invested £5,000 in planting and draining, and set his mind to make his place a proof of the patriotism, the wisdom, the prudence, and the profitableness as well as pleasure of planting. His love of "the good green wood" was founded not only in the delight it communicated to his poetic eye, but on his faith in its power to put money into the landed proprietor's purse, and to provide useful employment for the population of a rural district. He quite understood the difference between planting mainly for profit, when things must be done at the smallest possible expense, and with the largest probability of safe and paying returns, and planting chiefly for ornament that the face of a country may be beautified. He gives the opinion with great wisdom and effectiveness that "the most useful style of planting," that which can be executed at the least expense, and which must ultimately return the greatest profit, is that respecting large tracts of waste lands, which by judicious management may be converted into highly-profitable woodland, without taking from agriculture the value of a sheaf of corn, or even greatly interfering with pastoral occupation, so far as that occupation is essentially advantageous. For we suppose it will be admitted that in any case where a stately and valuable forest can be raised by the restricting of a few hundred score of sheep to better and richer pasture-land than they formerly enjoyed, great advantage will accrue to the landlord, and no loss will be sustained either by the tenant or the poor animal who, now picking up his grass by piles at a time in a wild howling wilderness, would then be better supported and more free from accidents of every kind. If planting "be only undertaken in a large sense by the persons principally concerned, it will be found," he thinks, "as advantageous to the poor as to the rich; providing for the over-population, as it is called, a hardy and healthy occupation, the object of which is the improvement of their native country, while the manner in which it is conducted is equally favourable to their comforts and to their morals."

He regards as "indispensable requisites for successful planting:—1st. A steady and experienced forester, with the means of procuring at a moment's notice a sufficient number of active and intelligent assistants. Enclosing, planting, pruning, thinning, and felling, are going on successively in different parts of the estate in one and the same year; and these are operations in all of which a good workman ought to be so expert as to be capable of working at them by turns. 2nd. The planters ought to be possessed of one nursery or more as near to the ground to be planted as can well be managed. 3rd. The next point is to choose the scene of operation." The plan "is to be drawn with a bold and not a timid hand," and the proprietor must not "endeavour to exclude from his proposed plantation all but the very worst of the ground;" for, "although trees, the noblest productions of the vegetable realm, are of a nature extremely hardy, and can grow where not even a turnip could be raised, yet they are sensible of and grateful for the kindness which they receive." He should be guided in his plantings by "the natural boundaries, carry them down to the glens on one side, sweep them around the foot of the hills on another, conduct them up the ravines on a third, giving them as much as possible the character of a natural wood, which can only be attained by keeping their boundaries out of sight, and suggesting to the imagination that idea of extent which always arises when the limits of a wood are not visible. In this manner the future woods will advance [towards] and recede from the eye, according to and along with the sweep of the hills and banks which support them, thus occupying precisely the place in the landscape where Nature's own hand would have planted them." He then proceeds to remark on enclosing, draining, the formation of paths for walking, riding, or driving, the preparation of the soil by cropping, fallowing, paring and burning, or otherwise, the choice of trees, the manner and time of planting the trees and the distance at which they should be placed from each other; nursing, pitting, screening, and many other arboricultural processes, in all of which good practical sound sense, keen poetical feeling, and carefully-studied experience are incorporated, and all of which show that we might say of Sir Walter Scott what is said of the squire's yeoman, in the "Canterbury Tales:"—

"Of woodcraft can [knew] he well all the usage."

The paper to which we have referred, "On the Planting of Waste Lands," though it is nearly now three-quarters of a century since it left the pen of the author, is still deserving of the careful study of the forester and the planter; and not less so is another, to which we now briefly call attention, viz., that on "Landscape Gardening," in the *Quarterly Review*, March, 1828. We think that our readers will relish the following extract from this paper, and will be inclined, we think, on reading it, to seek the wisdom that is contained in the whole article on the important subject with which it deals:—

"The three materials with which the rural designer must go to work—the colours in other words of which his landscape must be composed, are earth, water, and trees. Little change can be attempted by means of digging away or heaping together earth; the levelling of rising grounds, or the raising of artificial hillocks only serves to show that man has attempted what is beyond his powers. Water is more manageable, and there are places where artificial lakes and rivers have been formed with considerable effect. But, to speak generally, this alteration requires very considerable advantages in the previous situation of the ground, and has only been splendidly successful where Nature herself had formerly designed a lake, though the water had escaped from its bed by the gradual lowering or sudden bursting of the banks at the lower end. Trees, therefore, remain the proper and most manageable material for improvement, and as trees and bushes can be raised almost anywhere, as by their presence they not only delight the eye with their various forms and colours, but benefit the soil by their falling leaves and improve the climate by their shelter, there is scarcely any property fitted for human habitation so utterly hopeless as not to be rendered agreeable by extensive and judicious plantations. But to obtain the immediate command of wood mature enough to serve as shade, shelter and ornament has been hitherto denied to the improver. He has been compelled to form his plan while his plants are pigmies; to await their slow progress towards maturity, and to bequeath as a legacy to his successors and descendants the pleasure of witnessing the full accomplishment of his hopes and wishes."

After having said this, Sir Walter Scott proceeds to discuss describe, and explain the nature, operations, and benefits of transplantation, giving peculiar prominence to the system of Sir Henry Stewart, of Allanton, Lanarkshire, and speaking generally of the transference of trees, he says, "Earlier or later this beautiful and rational system will be brought into general action, when it will do more to advance the picturesque beauty of the country in five years than the slow methods hitherto adopted can attain in fifty. Our readers are now enabled to answer with confidence the question of Macbeth,

> 'Who can impress the forest? Bid the tree
> Unfix his earth-bound root?'

But the subject, though to ourselves of special interest, has already perhaps detained some readers too long. *Non omnes arbusta juvant.*"

As we know that "all" our readers, unlike those who read the *Quarterly Review*, "delight in growing trees," we need scarcely apologize for recalling from this paper the fine observations made by Sir Walter Scott regarding the appreciation of forest scenery by the old English poets.

"The ancient English poets, Chaucer and Spencer in particular, never luxuriate more than when they get into a forest; by the accuracy with which they describe particular trees, and from their noticing the different characters of the different species, and the various effects of light and darkness upon the walks and glades of the forest, it is evident that they regarded woodland scenery, not merely as associated with their favourite sports, but as having in itself beauties which they could appreciate, though their age was not possessed of the fascinating art of committing them to canvas. Even the common people seldom mention 'the good forest,' and 'the merry green wood,' without some expression of fondness, arising doubtless from the pleasure they took in the scenes themselves, as well as in the pastimes which they afforded."

The quotations made, which might be largely extended, show, we believe, that Sir Walter Scott had studied the art of Forestry both with the eye of a poet and a practical and sagacious man; that he pursued his plantings at Abbotsford in accordance with a wholesome knowledge of tree-life and an enthusiast's sense of the picturesque; and hence we infer that Abbotsford supplies a good test of the value of Forestry begun and carried on with intelligence and taste in improving land, beautifying landscape and imparting amenity and comfort to a bleak and barren district. We have his own account of his aim in regard to this rapidly acquired and improved estate in his introduction to "Rokeby," edition 1830, and we have the reality now extant in the result of foresight and perseverance in the finely-wooded landscape which makes Abbotsford the delightful vision to which pilgrims from all lands come as to a shrine.

The land he bought, he said, "had a stretch of meadow-land along the river, and possessed, in the phrase of the landscape-gardener, considerable capabilities. It had been, though the gratification was long postponed, an early wish of mine to connect myself with my mother earth, and prosecute those experiments by which a species of creative power is exercised over the face of Nature. I can trace even to childhood a pleasure derived from Dodsley's account of Shenstone's Leasowes, and I envied the poet much more for the pleasure of accomplishing the objects detailed in his friend's sketch of his grounds than for the possession of pipe, crook, flock, and Philis to boot. . . . With the satisfaction of having attained the fulfilment of an early and long-cherished hope, I commenced by improvements, as delightful in their progress as those of a child who first makes a dress for a new doll. The nakedness of the land was in time hidden by woodlands of considerable extent—the smallest of possible cottages was progressively expanded into a sort of dream of a mansion-house, whimsical in the exterior but convenient within." All was not blest in this Parnassian Eden, for we know that in 1817, in a fit of languor and pain, he sang—

"The sun upon the Weirdlow Hill
  In Ettrick's Vale is sinking sweet;
The westland wind is hushed and still,
  The lake lies sleeping at my feet.
Yet not the landscape to mine eye
  Bears those bright lines that once it bore,
Though evening with its richest dye
  Flames o'er the hills of Ettrick's shore.

With listless look along the plain,
  I see Tweed's silver current glide,
And coldly mark the holy fane
  Of Melrose rise in ruined pride.
The quiet lake, the balmy air,
  The hill, the stream, the tower, the tree,
Are they still such as once they were?
  Or is the dreary change in me?

Alas! the warped and broken board
  How can it bear the painter's dye!
The harp of strained and tuneless chord,
  How to the ministrel's skill reply!
To aching eyes each landscape lowers,
  To feverish pulse each gale blows chill;
And Araby's or Eden's bowers
  Were barren as this moorland hill."

This minglement of joy and sorrow—the prose of pride in possession and achievements, and the poetry of overstrain and wearying worry—may fittingly close this notice of Sir Walter Scott as a forester, for they harmonize with the feeling one has at Abbotsford of joy and pride at the glorious realization of a poet's dream and of grief and woe at the thought that the creator of so much that was grand and great was called away so early from the scene of his success and his glory.

## ENGLAND.

Arrears of planting will demand the forester's principal attention, and these should be followed up closely in all favourable weather. Though there has been hitherto far too much rain for the heavier soils, and the prepared holes have stood full of water like so many cups, the season has on the whole been favourable for the work upon lighter land. The present depression in agriculture should cause much more attention to be bestowed upon the planting up of heavy clays and the thinner hill soils. Where small plants can be pitted in at little cost, or notched in by a man and boy at the rate of from 1,200 to 1,500 per day, the first cost should be no impediment to the planting of such land. Where a home nursery is kept the expense is still further lessened, and the total cost may be reduced below £2 per acre, not including the ploughing, trenching, or holing of the land, where such operations are necessary.

Thin out mixed plantations, reserving the felling of ash until towards the end of the month. Poplar, elm, lime, plane, and sycamore trees may be felled at once. By this time good progress should be made with the cutting of coppice and underwood. During dry weather every effort should be made to remove the produce, and to collect such as cannot be carted away at once along the sides of the clearance roads. Shave hop-poles as soon as possible after cutting, and bed them up for summer dipping. Also shave or notch and cover up use poles, and remove faggots from the falls.

When the weather will permit, young plantations of birch may be dug and filled up, all two-years-old plants of stunted growth being severed with a clean cut near the ground. A few standard birch trees will be found very serviceable in such plantations, the seed being scattered freely by the winds of autumn, and helping materially to fill up vacancies.

Besides being well-trimmed, hedgerows should now be dug or hoed, and thoroughly cleaned. Tolerably strong hawthorn plants are required for woodland hedges. These should not be less than three years' plants, which have been two years transplanted. If such are planted in a double line, at distances of eight or nine inches, and cut off, and afterwards protected for a few years, they will rapidly form a hedge. A good outside ditch will generally be found necessary in such situations.

Coniferous seeds may generally be collected during the present month; and such other seeds as are intended for spring sowing should be examined from time to time, and turned over in the heaps.

Continue to hole and trench for spring planting, and lay up roughly all plots of ground which are then intended for beds for tree-seeds. During suitable weather plenty of work will be found in the nurseries, wheeling on manures, limes, and composts, trenching vacant patches, and digging and cleaning between the rows of young plants.

*Pluckley, Kent.* A. J. Burrows.

## SCOTLAND.

Continue to thin plantations, and fell full-grown timber. In thinning woods which have arrived at say forty or fifty years of age, it is important for the future growth of the timber that care should be taken not to overdo it. Plantations at this stage, which have passed the period of their most vigorous growth, are very liable to suffer from severe thinning, and it occasionally happens that the standards which are left never regain their wonted vigour, nor ever fully cover the ground from which the thinnings have been taken. The evil resulting from such a process is two-fold: the timber does not advance at the rate it should do; and the ground is also not under full crop. In order to raise good, clean, saleable timber, the ground should be under full crop.

Should the snowstorms of last month continue, it will retard outside work materially. In deer parks fell trees, or cart branches so as to keep the deer from the growing trees. Turn compost heaps. Make new roads which require excavations. Attend to water-pipes which come near the surface, and keep the taps running to prevent damage from frost. W. W. R.

## IRELAND.

Hitherto the weather has been most propitious for planting operations, and every one having such work to do has been very busy. This season larch plants were rather later than usual in completing their growth, which prevented so early a start at planting, but since the work was begun there has been no interruption with bad weather. It cannot be too often repeated that the drier portion of the intrenched plantations ought to be planted first, and all sour, damp soil left over until later in the season. When the work of planting is interrupted with frost, the men could be employed opening drains on any moist ground, so that, regulating operations in this manner, the staff of men can be continuously employed. It is to be hoped that the instructions often laid down under the above heading are assiduously carried out, and that in all removing of plants the utmost care is taken of the roots, guarding them from frosts and cutting winds.

Now is the time to go on with alterations on the farm, levelling ditches, and cutting hedgerow trees. Begin planting thorn hedges, and repair by new sets gaps in old fences. Before planting thorn the ground ought to be well dug and cleaned, so as to give a mellow bed for the roots to strike in.

Ground work of every description may now be pushed on with, as during the present month agricultural work is not pressing. Farm roads should all be repaired during the present month, and all cleaning of roads and dikes carted into heaps as compost. No time ought to be lost in having top-dressing spread when previously prepared. Top-dressing meadow land is so essential that nothing should interfere with it during the month.

*Ballinacourte, Tipperary.* D. SYM SCOTT.

## WALES.

THE forester's work for the present month will be much the same as last, in clearing and preparing ground for planting, and where necessary draining land to be planted in the spring. The planting of forest trees should be pushed forward during the early part of the month, during mild and open weather.

Continue the cutting down of hedgerow and other timber trees for sale, and have them removed during favourable weather. As much strength as possible should now be brought to bear on the cutting of underwood, and the thinning of plantations of all kinds. Plantations consisting of trees large enough for sale or home use should be thinned first, whether firs or hard woods, leaving the younger ones till the spring. Clear out all open drains and ditches after the thinnings have been removed, as they are liable to be chocked by the removal of the thinnings. Bind up faggots, and prepare firewood for home consumption.

Roads and drives should now be put in thorough repair; if stones or other material are put on now, they will get settled down by traffic before the spring.

*Kinmel Park.* LEWIS BAYNE.

# THE HOME FARM.

## OPERATIONS FOR DECEMBER.

*Arable land* may still be ploughed, either by steam or by horses, in preparation for spring and summer crops. Where turnips have been folded off, the ploughing should be light, and it is better to keep the land closely ploughed up, to prevent loss of manure by too long an exposure to rains. Preparation should at once be made for the reception of corn crops in spring, as well as for mangolds and other root crops. Bare fallows should not be necessary where steam-power or sufficient horse labour is kept for clearing the land in autumn. Manuring, chalking, claying, marling, liming, &c., may be carried on according to locality, weather, and the requirements of the land.

*Hop gardens.*—The digging of heavy lands may at once be commenced. Preparatory to this, all old poles and bines should have been carted off, new poles carried on, and dressings of long manures, woollen rags, fine bones, fish, &c., applied. The digging should be to the full length of the spud or fork employed. The practice of inserting this at an angle of 30° or 35° with the surface of the soil, and throwing forward one thin spit to hide the unmoved breadth in front, is a worthless expenditure of money. Provided the spit is well turned, the rougher the surface is left the better. All vacancies in old gardens should now be filled up with bedded sets from the nursery, and new ones be planted without delay.

*Live stock.*—Horses being in regular work, either upon the land or upon the roads, will require their full allowance of chaff and corn. As suggested last month, a proportion of carrots or pulped roots may be supplied to them. Feeding bullocks will now be confined to the stalls and sheds, where they should be kept warm and well littered, and have an abundant supply of pulped roots and chaff, with from eight to twelve pounds of mixed cake daily, according to the size and condition of the beasts. Young stock, including colts, will also require shelter in bad weather, and liberal feeding. Especial attention should now be paid to the ewe flock. If the month prove a wet one, liberal supplies of dry food will be necessary to counteract the tendency to abortion, which is induced by overfeeding upon turnips, either too succulent, or in a partially frozen state. Where the roots have been drawn and covered up from the frost, the practice of pulping in the field, and mixing with chaff, malt coombs, or other dry food, is to be strongly recommended. If this entails some labour, it will be more than repaid in the healthy and flourishing condition of the flock.

*Irrigation.*—Pay constant attention to water meadows, regularly removing all obstructions to the flow. Should frosts set in suddenly continue the overflow until milder weather permits of its being taken off. When during open weather a thick scum appears upon the surface, it is generally time to change the water.

*Fences* may still be trimmed or plashed according to their requirements. But the most rapid spring growth is said to follow when these operations are carried out from the middle of February to the end of March. In filling up old hedges, or planting new ones of hawthorn, at this season of the year, it will be well to cut off the quicks close to the surface of the ground, and cover them up with a little fine soil. If this be carefully removed by hand in April, a good start will be obtained.

*Orchards.*—Continue to prune old orchards, as well as all plantations of gooseberries, currants, and raspberries. The latter should now be dug and cleaned. New orchards may also be planted.

*Manures* should be carted into the fields for spring and summer use. To keep the heaps firm and compact, and prevent an undue or too rapid a fermentation, they should be consolidated by carting over them. Sprinkle gypsum with the manure in the yards to fix the ammonia, and cover up in the fields with soil and salt, afterwards thoroughly incorporating these by turning.

*Drainage.*—This should be carried on throughout the winter months. Take care by laying out the lower lands first to secure ample delivery from the upper. Where possible, do not permit too large an acreage to depend upon one outlet. But when necessary the following sizes of mains will be found equal to the discharge of the ordinary rainfall of 30 inches upon medium soils, viz.:—3 inch pipes, an area of 5 acres; 4 inch, 8 acres; 6 inch, 23 acres; 9 inch, 54 acres; and 12 inch, from 90 to 94 acres. Upon very stiff soils the mole plough may with advantage follow under-drainage.

*Dairy cows.*—As the pastures will now be bare, and the weather probably inclement, the cows will require partial shelter, and a full allowance of roots, chaff, and cake.

*Poultry* will be in great demand in the market, and everything which is fat should at once be sent there. Turkeys and geese will be in especial request as Christmas approaches.

*Miscellaneous.*—The threshing out and delivery of corn should as much as possible be limited to dry and frosty weather, as the samples are then in the finest condition for market. Besides, wheat and oats which were harvested indifferently, are then more apt to part freely from the chaff. Materials for farm roads should be obtained, and carted and laid on, all ditches being well scoured out, and water-courses kept free. Too thick a coating of road metal should never be laid on at one time.

*Estate work.*—Complete the laying in of the winter's supply of fuel, and carry draining pipes, roofing tiles, or slates, and lime and sand. Cart timber and faggots from the early falls. B.

## FORESTS AND METEOROLOGY.

An important paper in *Polybiblion* on this subject gives the results of observations made during the last six years under trees and not far from the edge of a forest, and also in the plain and far from all trees. 1. Forests increase the quantity of meteoric waters which fall on the ground, and thus favour the growth of springs and of underground waters. 2. In a forest region the ground receives as much, and more water under cover of the trees than the uncovered ground of regions with little or no wood. 3. The cover of the trees of a forest diminishes to a large degree the evaporation of the water received by the ground, and thus contributes to the maintenance of the moisture of the latter and to the regularity of the flow of water-sources. 4. The temperature in a forest is much less unequal than in the open, although on the whole it may be a little lower; but the *minima* are there constantly higher, and the *maxima* lower than in regions not covered with wood. These observations have been made in the neighbourhood of Nancy, and by the pupils of the School of Forestry of that city, under the direction of M. Mathieu, Sub-Director of the School. On the other hand, M. Fautral, when Sub-Inspector of Forests at Senlis, made during four years, but on a different method, observations on forestal meteorology which fully and completely corroborate in certain respects those of M. Mathieu. The laws which seem to follow from the figures given by M. Fautral, as well as an inspection of the curves which graphically represent them, are as follows:—1. It rains more abundantly, under identical circumstances, over forests than over non-wooded ground, and most abundantly over forests with trees in a green condition. 2. The degree of saturation of the air by moisture is greater above forests than over non-wooded ground, and much greater over masses of *Pinus sylvestris* than over masses of leaved species. 3. The leafage and branches of leaved trees intercept one-third, and those of resinous trees the half of the rain water, which afterwards returns to the atmosphere by evaporation. On the other hand, these same leaves and branches restrain the evaporation of the water which reaches the ground, and that evaporation is nearly four times less under a mass of leafed forest than in the open, and two and one-third times only under a mass of pines. 4. The laws of the change of temperature out of and under wood are similar to those which result from the observations of M. Mathieu. The general conclusion seems to be that forests regulate the function of water, and exercise on the temperature, as on the atmosphere, an effect of "ponderation" and equilibrium.—*Times.*

## DETERIORATION OF SCOTCH FIR.

Sir,—In referring to W. W. R.'s letters on this subject in your October issue, your readers' attention has been called in your September issue to the points on which he and I agree and disagree. The most vital and important point upon which we differ is the seventh, with regard to which I put the same question to him twice, and your readers will see how he each time adroitly evaded the answering of it. We therefore must excuse those who may remain under the impression that his reason for this is simply—that he cannot answer it, and that he has been trusting far too much to theories and opinions doing the work of facts for him.

As it is evident that nothing is to be gained by continuing this controversy any further, this is my last letter upon it.

*Dunrobin, Sutherlandshire.* D. McCorquodale,
*Forester.*

## ARE TREES INJURED OR BENEFITED BY THE DECOMPOSITION OF THE PRUNINGS WHICH MAY SURROUND THEM?

Sir,—Mr. D. Sym Scott gives us some valuable information about the habits of the pine caterpillar in your last issue, and confirms what I said on page 213 regarding their sudden appearance in great numbers, the great destruction they are capable of doing to fir-tree foliage for two or three consecutive years, and then their as sudden disappearance. He says, "It does not require such a large number of flies to produce a fabulous array of caterpillars. A single *chermes* lays for each brood over one hundred eggs, and two or more broods are produced in a season." I quite agree with him here. From this one would naturally expect that so long as green fir-leaves existed, caterpillars from where they began the ravages would go on increasing in the same ratio, to the entire destruction of all the pine foliage in the country, if not *stopped by some cause.* Mr. Scott further says, "I could only account for their appearance by an emigration of flies into the district, and their disappearance to local circumstances. Insects will increase or decrease according to the nature of the district, whether conducive to their development or otherwise."

Perhaps he will kindly tell us what are the "local circumstances," and the "nature of the district," to which he refers, that can possibly tempt the pine saw-fly over miles of country, where large fir plantations of various ages, and on many descriptions of soils, and varieties of exposures, are growing, and alight on a young plantation of, say ten years old, and six ft. high, and then increase in thousands for two or more years; and also what could have as suddenly destroyed, or disturbed them again, as to cause their entire disappearance.

Mr. Scott says that "the plantation Mr. McCorquodale writes about as devoured with caterpillars had never been thinned, lends him no support in his theory that decaying rubbish does not encourage the breeding of injurious insects." And I would here remark (if looked at apart from other circumstances) in this I quite agree with him; but, on the other hand, he evidently quite agrees with me in showing that injurious insects accumulate and propagate themselves in plantations without the aid of decaying rubbish of any sort to induce them to increase.

I repeat that I am not aware that anybody found the pine weevil do any harm to plantations, say five years old, or to young trees, say 3 ft. high (see page 215). With regard to this Mr. Scott says, "No such limits are to be found. I have seen trees attacked much older and taller than Mr. McCorquodale has been aware of." Will he kindly tell us how much older and taller were those he saw attacked, and where? Mr. McCorquodale, of Scone, told us ("Transactions of the Scottish Arboricultural Society," vol. ii., page 52) that, after the ground from which a crop of old Scotch fir was taken had been again planted with small trees of the same sort, the weevil destroyed them by barking round near the ground. He likewise told us how he treated the soil so as to kill the weevil, and how he again planted it with two years' transplanted plants, and said, "If the plants are healthy and strong when planted, they will, by the second year, be beyond the reach of being much damaged by the insect." To this paper of Mr. McCorquodale's, Robert Hutchinson, Esq., of Carlowrie, approvingly refers ("Transactions," vol. vii., page 123), and so does Mr. Dunn, Dalkeith (*Ibid.*, vol. viii., page 177).

This is a very important question, because, if there is a limit to the age of a plantation and the height of young trees beyond which the weevil will not go, the prunings which may surround these young trees after each thinning may safely be left as they lie, to decompose into fresh, well-pulverized earth, composed of the best proportions, both of the organic and inorganic constituents of these trees, the removal of which would not only seriously add to the outlay, but rob a poor soil of its best part, thereby making it less fertile.

D. McCORQUODALE.

*Dunrobin, Sutherlandshire.*

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## CAUSES OF THE LARCH BLIGHT.

SIR,—I have to thank Mr. McLaren for his remarks as to the cause of the larch blight. I should also be pleased to hear his opinion and that of others as to the effects of severe frosts upon the previous season's growth of larch (under twenty years old) when the wood has been badly ripened, after a very wet, cold, and sunless summer, such as 1879.

LEWIS BAYNE.

*Kinmel Park, Nov. 19th, 1880.*

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## THE DETERIORATION OF LARCH AND SPRUCE IN THIS COUNTRY.

SIR,—During the discussion "upon the deterioration of larch and spruce in this country" at the recent meeting of the Scottish Arboricultural Society, it will be observed that while some valuable and interesting points were advanced, there was also a fair share of "humbug,"—beg pardon, Mr. Editor, but the word was used by one of the speakers, and it answers so well that a substitute is not readily found. Without going into the rambling arguments at times making their appearance during the discussion, it is obvious that more light is wanted on this important subject. Mr. Wm. McCorquodale, speaking of the aphides, said, "they fix themselves at the extreme points of the branches, and when the sun is shining the trees glisten with their own sap escaping from punctures made by the aphis, and were bleeding to death. The extreme points dried up, and the sap which could not circulate throughout the whole tree, was thrown back on the bole sap-vessels which burst and gave rise to ulceration in the boles." This is very well laid down, but how are we to prove it correct? The *Chermes* are so minute that their suctorial tube could not pierce the scaly bark, but have to locate themselves on the more succulent part at the extremities of the branches. The glistening seen on trees is traceable more to the ejection of honey dew than the trees bleeding to death. Although the insect is minus the setiform tubes, the honey dew is present. On what precedent does Mr. McCorquodale build his theory, that when the sap is retarded or totally intercepted in its rotary flow it is thrown back on the bole, rupturing the sap-vessel and causing blistering on the stem? This, if a correct theory, is a most important one. Another gentleman, endorsing Mr. McCorquodale's remarks, observed that insects attacked more readily in dry weather and bright sunshine, but goes on to say "last year was one of the brightest on record, and the larch were *not* attacked." This statement is either a feeble truism or enigmatical, whichever the reader thinks proper to accept, but none the less irreconcilable with the correct facts of the case. Another speaker, possessing more discerning proclivities, informs us that he has seen the wound made by the aphis on larch trees heal up, and the trees, although a little deformed, apparently had got over the effects of the wounds. The punctures made into the bark of trees by the aphis family are so minute, and seeing that it requires the aid of a powerful magnifier to discern them, one is apt to believe our arboricultural *savans* have, judging by their remarks, been but imperfectly prepared for the discussion. Far be it from the writer to depreciate any well-intentioned opinion, at the same time he holds the deterioration of larch to be too important to foresters to be lightly passed over, and suggests that the subject be taken up and freely discussed in the *Journal*. It might be an advantage when dealing with the subject to describe fully the treatment of the ground in nursery for larch, the nature of surface and subsoil when planted out, aspect and exposure, and general management.

*Ballinacourte, Tipperary.* D. Sym Scott.

## WHAT ARABLE LANDS IS IT ADVISABLE TO PLANT?

Sir,—After perusing Mr. Lipscombe's article on this subject in your last issue (page 428), I feel induced to offer the following remarks thereon. At the outset I may state that where a proprietor could realize a moderate rental for his clay lands, it would be unadvisable to plant except where he would increase the value of the surrounding land by the beneficial influence of the shelter it would receive by doing so; and I may remark that there is abundance of such shelter required throughout the country for the benefit of stock and crops, but it should be allocated where its influence would act in the most beneficial manner irrespective of the value of the land.

Clays as well as most other classes of soils may be improved, more especially such as have been already under cultivation, and when it has paid to cultivate it when in an undrained state its value would certainly be enhanced by a judicious outlay of, say £10 per acre—the amount Mr. Lipscombe proposed in draining, &c., and planting—in draining and otherwise improving the texture of the clays. The proprietor would then have less difficulty in securing a tenant for his holding, with the prospect of an improved rental. I by no means advocate in all cases the keeping under cultivation of stiff clay lands, as there are undoubtedly instances where it would be desirable to lay the land down to grass, or plant for the reason already adduced, viz., for shelter, but it would be altogether a hopeless task to attempt either without thorough drainage.

Mr. Lipscombe asks, "Can the £4 10s. be dispensed with?" that is the amount he intended for draining. I say most decidedly, no, although I think 10s. may be knocked off, his estimate being that amount too high, but the sum intended for fallowing could be safely dropped out, as that operation would serve no good purpose. Greater success with the plantation would be attained if the ground was allowed to rest until it had become consolidated on the surface and a sward grown thereon, after draining and before planting, as the plants would then have a better chance of retaining their position than by planting them in broken-up clay, which by the influence of frosts and every downfall of rain is generally turned into a complete puddle on the surface, thereby rendering the plants liable to be swayed about by every gust of wind that may strike them, and causing an open space to be worked round the neck of the plant, so that when frost sets in irreparable damage is often the result, by the abrasion of the bark at the surface of the ground, owing to the working of the plant on the frozen surface. Preparing the ground for planting by ploughing or trenching tends to stimulate the plantation's growth for a few years, but the beneficial results supposed to be derived from these operations will not justify the necessary expenditure in extensive undertakings, and I would certainly expect equal success with plantations formed on ground, the surface of which had not been broken up, with the exception of such soils as had an impenetrable crust underlying the upper stratum; such crust of course would require to be made so that the tree roots could freely penetrate down through it before success could be expected.

In conclusion I would say drain in winter all damp clay lands intended for planting by open parallel drains 7 yards or so apart, and 2 ft. wide at the surface by 2½ ft. deep, and all soil taken from them thrown back on the space between the drains and properly levelled down. In the following autumn make pits for the plants, allowing them to remain open over winter, and plant in spring, choosing dry weather for that purpose.

A. SLATER.

*Wyreside, Lancaster, Nov. 17th,* 1880.

## A FINE TULIP TREE.

SIR,—There is a fine specimen tulip tree (*Liriodendron Tulipiferum*) growing on the pleasure-grounds at Milton Abbey, and the writer is desirous to know through your columns if this tree can be equalled or surpassed in the south of England.

The circumference 1 ft. from ground, 15 ft.
„ 6 ft. „ „ 13 ft.

At 8 ft. from the ground one huge limb breaks out, and at 11 ft. it divides into two such limbs. The height is about 60 ft., spread of branches 45 ft. It grows luxuriantly, and is very handsome.

W. WATSON.

*Milton Abbey, Blandford, Dorset,*
*Nov. 16th,* 1880.

## THE APPARENT DESTRUCTION OF *WELLINGTONIA GIGANTEA*.

THROUGH an oversight, our reply to Mr. Parkin's letter on the above subject, in the October *Journal*, has been omitted. The great abundance of the spiders upon the trees is rather unusual, and no doubt their numerous webs or nests are to some extent injurious to the welfare of the plants; but the spider family, *Araneidæ*, are of themselves quite innocuous to plant life. The insects sent us by our correspondent belong to the true spiders, *Arachnidæ filosa*, or *Anareidæ*, and to the sub-division *Niditelæ*, but they were so decomposed when they reached us that the species could not be determined. All the true spiders are insectivorous, and the nests sent us are full of the remains of other insects devoured by the spiders. The twigs of the *Wellingtonia* indicate the unhealthy state of the trees, similar appearances being common where the *Wellingtonia* is planted in cold or wet soil. We should be glad to have the opinion of any of our readers who have observed similar appearances among their trees to those described by Mr. Parkin.—Ed.

## DRY ROT IN LARCH.

Sir,—My attention has been recently called to a circumstance connected with that mysterious question, the failure of larch, which may perhaps be of interest to some of your readers.

About twenty years ago I came into possession of a rocky bank which had been planted, and from which the trees had been cut. I replanted it principally with larch, and have of late years begun to thin it.

I find that while the greater part of the trees cut were sound, some were affected with dry rot, my observation confirming the assertion of the woodman that the affected trees are only to be found in two localities which have been cultivated, differing from the rest of the wood in no other respect, that I can perceive, except that they are probably of somewhat better soil and freer from stones. Can it be that cultivation has extracted some quality from the soil which is necessary to the well doing of the larch?

The wood in question is in one of the south-eastern counties of Ireland, on a granite formation, with a steep slope to the north and north-west, and at an average elevation above the sea of about 700 feet. C.

## WEYMOUTH PINE AND HEMLOCK SPRUCE.

Sir,—I see notices in the November number of the *Journal of Forestry* about the Weymouth Pine and Hemlock Spruce, containing statements which are not borne out by my recollections of those trees in Canadian forests, and by my home experience. Your correspondent, "Pinus Strobus," recommends for Weymouth pine "a light clay loam, rather sandy, with a dry bottom." Now in Canada I recollect to have seen the finest specimens on rich flats near streams, and at home the largest trees of the kind that I am acquainted with grow in a similar situation. The timber of the Weymouth Pine is, I believe, known in commerce as "Canada white deals."

Then as to the Hemlock Spruce I recollect to have seen in Canada, forests composed of this tree on very wet ground, and known locally as Hemlock swamps; acting on my recollections I have transplanted a Hemlock Spruce from a dry spot to a very wet one, and have been rewarded by the increased vigour of its growth.

The Weymouth Pine and Hemlock Spruce will do fairly well on dry ground, but to have them in perfection I would recommend that the former should be planted in a damp flat near a stream, and the latter in downright wet ground. C.

## QUESTIONS.

73. **How to Renovate Ivy.**—Would you or any of your readers inform me the most effectual way of renovating ivy, which has grown for many years on a tower, and which is now in places showing signs of decay? The ivy was trimmed last year.—A. E.

74. **Specimen Trees.**—I shall feel specially obliged if any of your numerous readers will give me, through your pages, the height and circumference, at 4 ft. from the ground, of the largest specimens in Britain of the following, viz.: Quercus Ilex, Pinus Laricio, and Picea Amabilis.—H. M.

## BRITISH TIMBER SALES.

**Herts.**—On the 22nd Nov. Mr. A. T. Parkes conducted a sale of timber on the Tring Park Estate, consisting of 1,140 beech trees, 125 beech tops and trees under 6 in. quarter girth, 180 oak trees, 80 larch fir trees, and 95 larch fir tops and poles. The whole were sold in lots of from 20 to 30 trees in a lot. The beech, which contained from 10 to 30 ft. in a stick, made from 1s. to 1s. 6d. per ft. cube. Smaller stuff less money. The oak, containing from 10 to 30 ft. in a stick, made from 1s. 4d. to 2s. per ft. cube. Larch fir, containing from 15 to 30 ft. in a stick, made from 1s. to 1s. 2d. per ft. cube. The buyers were chiefly from the neighbourhood, and the demand was not so great as last season.

**Scotland.**—On the 18th inst. a large quantity of cut wood on the Kinnaird Estate, Brechin, was offered for sale at the Commercial Hotel in large lots. First, 593 Scotch firs, 34 larch, Mr. Ewen, Forfar, £62; lot 2,913 Scotch firs, 23 larch, Mr. Ewen, £90; lot 3,910 Scotch firs, 69 larch, 19 spruce, Mr. Ewen, £32; lots 4 and 5 were not sold; lot 6, 524 Scotch firs, 25 larch, Mr. J. Millar, Blackiemill, £30; lot 7, 248 Scotch firs, 126 spruce, 17 larch, £20 5s., Mr. J. Millar. The bidding was very stiff, and few merchants were present.—*Timber Trades Journal.*

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**Mr. J. A. Harvie Brown.**—We much regret that in last month's *Journal* we intimated that Mr. J. A. Harvie Brown, of Dunipace House, whose decease we recorded, was the author of the useful and well-known book on the "Capercailzie." We are informed that it was Mr. J. A. Harvie Brown's father who died recently, and we are happy to learn that the well-known ornithologist, the author of the book referred to, is in good health.

*The Fern Paradise.* By Francis George Heath. Serial issue. London: Sampson Low, Marston and Co.

The eleventh part of this interesting work contains a full account of the Spleenwort group of ferns, comprising ten species, viz.:—the Forked, the Alternate, the Rue-leaved, the Black Maidenhair, the Lanceolate, the Rock, the Green, the Common Maidenhair, the Sea, and the Scaly Spleenworts. Plate 7, issued with this part, illustrates in a clear manner all the above-named varieties described in the text. We extract the following from the opening chapter:—

"The Spleenworts form a charming group, many of them being very small. But all are evergreen. They all delight to grow in rocky or stony crevices, sometimes on walls—disporting themselves in the sunshine, but always preferring shade and moisture for their fibrous rootlets. The little waving tufts of the smaller species conspicuously ornament the rocks or walls on which they grow, whilst the larger kinds wear their beautiful fronds with a nobler grace. The common or popular name was given to this group of ferns on account of an ancient belief in their power, when used as medicine, of curing splenetic affections."

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**Damage to Trees by the Weather.**—In the Southdown district north of Worthing, the late heavy fall of snow upon trees still in full leaf has proved disastrous, especially to the oak trees. In some woods the damage done to our chief timber trees is in many cases one of permanent injury. It is painful to see the havoc brought upon one of our old oaks, certainly one of the finest in the chalk district, and probably not less than 160 years old. It had hitherto weathered successfully all storms, including being partially struck by the electric fluid some years ago, but was overcome by the snow on the 20th Nov. falling upon its leaves and acorns, accompanied by a sharp wind from north-east. Two magnificent branches, equal in size to an average tree, cracked short off close to the main trunk; other branches, more or less large, gave way at the same time. One of these proved to be hollow, and the winter store of acorns of some mischievous squirrels were exposed to view. They had, unperceived, been busily at work nipping off the top shoots of the tree some days before, to secure the acorns. Another branch, twenty-five feet above the ground, proved also to be hollow, and, the broken portion being cut asunder, it fell to the ground. A slight but sharp cry was instantly heard, and, a saw being applied to find out the cause, a very fine bat was brought to light; its measurement was as follows: Width across wings, 13 in.; length of body, 3½ in.; width of ditto, 1¾ in. The body was covered thickly with soft fur of a rich brown colour. Concluding it had received injury from the fall, its life was not preserved, and it was reserved for stuffing.

# OUR FOREIGN EXCHANGES.

THE November issues of the periodicals usually sent from France, Spain, Austria, and Bohemia, have been received.

In the *Revue des Eaux et Forêts* is a paper on the Pastoral Economy of the High Alps, wherein is discussed the bearing of this on the destruction of trees; and another entitled "Observations on the *Maladie ronde*, and the Manteau Pines and Scots Firs in Sologue." This last is taken from the Transactions of the Agricultural Society of France, by which Society there was, on the recommendation of the Committee on sylvature, awarded to the author, M. Seuvrat de la Boulage, one of the gold medals of the Society. A translation of it is forthcoming whenever space may be found for it in the *Journal of Forestry*.

In the preceding number of the *Revue* it was reported that M. Nanquette, Director of the School of Forestry at Nancy, has retired, and been succeeded by M. Putard, Inspector of Forests and Professor of Jurisprudence, and who with this directorship of the school has received the rank of Conservator.

M. Nanquette, who has a European reputation, left the school in 1838, and re-entered it in 1845 as Professor of Sylviculture.

The three and thirty successive batches of foresters whose first steps in their career were taken under his direction, writes the editor of the *Revue*, know well the almost passionate devotion which he had for the school, and parental solicitude which he manifested for the students. Emulous of maintaining for the school a place in the first rank of such institutions, he laid himself out to raise the standard of study by improving at once the programme of study and the means of instruction; but above all he sought to inspire the young men with the highest sentiments of honour and duty. And France knows that the foresters have given proof in the hour of danger that they have profited by this instruction.

M. Nanquette has received on retiring, as a mark of the high esteem in which he was held by the administration, the title of Inspector-General.

M. Putard stands high in public estimation as a jurist and as a forester, and it is anticipated that he will carry forward with honour the work of Messrs. Lorenz Parade and Nanquette, his distinguished predecessors in office, maintaining in the school the spirit of diligence, discipline, and dignity, for which it possesses a well-deserved reputation.

M. Mathieu, the sub-director, has also retired. He left the school in 1835, and re-entered in 1845 as Professor of Natural History. To him France is indebted for the application of Natural History to forests. An indefatigable workman, he has, without interruption to his stated labours or going out of his course, published numerous works, which have procured for him a place amongst the eminent naturalists of the day. The collections in the school, patiently formed by him throughout a period of well-nigh forty years, constitute to-day a veritable scientific treasure.

M. Mathieu, it is reported, will continue throughout the leisure secured by his retirement the work to which he has devoted his life.

In this number is published short biographical notices of both, issued on the authority of the new Directors and the Professors of the School of Forestry.

The *Revista de Montes* announces the formation of an association for the purpose of developing the industries connected with the cork tree, and of harmonizing and advancing the interests of landholders, manufacturers, merchants, and workmen alike. And it is proposed to publish a bulletin with a view to protect the interests of proprietors of cork trees and of cork manufacturers. And there are given continuations of papers on the ravages of the phylloxera, and proposed remedies for the evil.

In Italy also there has been founded a society to promote the development of sylviculture. This society, which began its operations on the first of June last, is presided over by Senator Torelli. The vice-presidents are Commander De Vicenzi and Commander Gierdano. It issues twice a month a bulletin designed to enlighten the country in regard to the disastrous consequences which follow from the clearing away of forests on the mountains, to the cause of the continually increasing frequency of inundations, and the means of preventing these, or diminishing their force. And it is proposed to have public conferences on these subjects of such importance to Italy.

John C. Brown.

# Collinson and His Contemporary Arborists.

It is now more than a century ago since some MS. notes of the celebrated naturalist, Peter Collinson, were discovered, which gave much information as to the trees cultivated in his days, both in his own extensive gardens and in those of the most celebrated of his contemporaries, and a list of all those he had himself introduced into this country from Russia, Siberia, America, and other parts of the world. It appears that he was born in Church Alley, Clement's Lane, afterwards removing into Gracechurch Street, about 1712. A visit to Peckham, in Surrey, created a taste for botanical pursuits, which never abated during his life. He was the contemporary of Wrench, who had grounds at Parson's Green which were famous for tulip trees, and who discovered the gold and silver hedgehog holly; also of Mr. Derby and Mr. Fairchild, who had gardens at Hoxton, and contributed much information to botanical literature. At the other end of the town were two famous nurserymen, Forben and Gray, having large tracts of ground in that way and vast stocks. At Bishop Compton's death the above mentioned made very large purchases from his noble collection. Brompton Park was another surprising nursery of trees at this time; and Mr. Miller, of the "Physic Garden," Chelsea, has left abundant proofs of his skill in rearing trees. In 1759 he notices two fine magnolias growing at Goodwood, and a larch of the late duke's planting that in twenty-five years was above 50 ft. in height, and cut into planks above a foot in diameter. Other larches are mentioned 70 ft. high. Lord Petre, who came of age in 1742, was a zealous arborist. In 1738 he planted the great avenue of elms at his country seat in Essex, raising two mounts at the top of the park which he planted with evergreens, placing a large cedar of Lebanon of twenty years' growth in the centre of each, supported by four larches of eleven years' growth. On the sides were smaller cedars, together with red cedars, &c. In the years 1741 and 1742, from this very nursery, he planted out 40,000 trees of all kinds, and it would require a large work to give a particular account of his building and planting. Dying shortly afterwards, his vast collection and extensive nursery were dispersed, the Duke of Richmond obtaining a thousand cedars of Lebanon for £79 6s. In 1762 a Mr. Clarke, a butcher at Barnes, conceived an opinion that he could raise cedars of Lebanon from cones from the great tree at Hendon Place. He succeeded perfectly, and raised them in such quantities, that he supplied the nurserymen, as well as abundance of noblemen and gentlemen, not only succeeding with cedars, but also with magnolia, and other tropical plants. In the Duke of Argyle's woods, stood, in 1762, the largest Weymouth pine in England. This, and his largest cedars of Lebanon were raised by him from seed near Hounslow. In 1748 Mr. Vernon, a Turkey merchant at Aleppo, brought over a weeping willow from the Euphrates, and planted it at his seat in Twickenham Park. This is the origin of all our weeping willows, the story of its being raised from the live twig of a fruit basket, received from Spain by Pope, being a fiction.

A noteworthy transaction took place at this time, when John Buxton, Esq., of Shadwell, near Thetford, from the acorns of 1762, planted 120 bushels on 42 acres of land, containing as near as could be computed, 1,432,320 acorns, or nearly 34,103 acorns to every acre. In 1762, also, the Duke of Devonshire planted 70 quarters of acorns, or 560 bushels. In 1736 the famous tulip tree in Lord Peterborough's garden at Parson's Green died. It was about 70 ft. high, and perhaps a century old, being the first tree of the kind that was raised in England. Mr. Bennett, who died in 1765, receives kindly recognition. He had premises at Shadwell, and was very industrious in procuring seeds of trees from abroad. He had also a garden at Whitechapel, which he cultivated with great success. The same year, Lord Rochefort, our ambassador in Spain, writes from Madrid, that there are very few forest trees in the country worth noticing, but that the ilexes about the Escurial are fine. One sort, he states, produces walnuts of a monstrous size, which are eaten at the best tables, being as sweet as chestnuts. In 1747 the diarist raised a new species of three-thorned acacia from seeds had direct from Persia. He also introduced the seeds of the Persian hornbeam, which was first planted and grown by a Mr. Gordon, gardener of Mile-end. In 1762 a very singlar fact is mentioned, which is vouched for, and is told as follows :—"This summer I was visiting Mr. Wood, of Littleton, Middlesex, who showed me a curiosity which surprised me. On a little, slender twig of a peach-tree, about four inches long, that projected from the wall, grew a peach, and close to it, on the other side of the twig, a nectarine.

Other similar instances have occurred, leading to the opinion that the peach is the mother of the nectarines, the latter being a modern fruit, as there is no Greek or Latin word for it. Although the labours of such men as those mentioned above are not sufficiently recognised by the public at large, the arborist well knows how much the country has owed and still owes to them. Although no longer needing a vast supply of naval timber every year, it must be remembered how few years have elapsed since our national existence depended upon it. Collinson probably knew the loyal American colonist, who, in order to keep up a sufficient supply of wood, proposed that Government should provide about 10,000 acres of land in the New Forest and Forest of Dean, to be set apart for the growing of locust, white oak, and live oak, to be cultivated by Chelsea out-pensioners, who perhaps were supposed to have made arboriculture their study, when not engaged in military pursuits. The absurd plan was, however, never tried. The same enthusiast also proposed an Act of Parliament to oblige every freeholder, copyholder, or other proprietor of land in the kingdom to plant a certain number of trees of durable wood, such as locust, oak, ash, elm, beech, birch, maple, lime, acacia, &c., in the soil along his grounds. It is well that Peter Collinson and his contemporaries ventilated no such foolish ideas, but left their age better and wiser than the previous one.

## Edinburgh Botanical Society.

The present session of this Society was opened with an admirable address by the President, William Gorrie, Esq., of Rait Lodge, Trinity. Amongst other interesting arboricultural remarks it contains the following:—

"Our native forests of the Scotch pine or fir (*Pinus sylvestris*) may be instanced as affording important examples of the beneficial effects of natural selection of that most important and extensively grown of timber trees. In 1874 I had an opportunity of carefully examining much of the famous Ballochbuie Forest, on the braes of Mar, which since then has fortunately become the property of our most respected patron, Her Most Gracious Majesty Queen Victoria. And I here use the word *fortunately* advisedly, as, from this grand old forest having become Royal property, a guarantee is afforded that it will be permanently preserved as a worthy remnant of those magnificent pine forests with which our highland glens and mountains were once so richly and widely clothed, but of which many have even recently been cleared away; and that it will continue to exhibit through far future generations as many noble specimens as it now does of the true valuable timbered, gigantic, smooth, reddish stemmed native Scotch pine or fir, with its picturesque, horizontal-branched, umbrella-like tops. In Ballochbuie I observed many varieties, and sub-varieties of the *Pinus sylvestris*, among which I had no difficulty in identifying the four described in the Caledonian Horticultural Society's memoirs for 1814, by that renowned Scottish botanist, the late Mr. George Don, as having been found by him in some plantations in the neighbourhood of Forfar, where he ascertained that the best native variety, which he called *Pinus sylvestris horizontalis*, only existed in the proportion of about three to ten or twenty of the others. In those parts of Ballochbuie Forest, which were most favourable for tree growth, such as in proximity to the drive from Balmoral to Invercauld as well as in dry-bottomed hollows, I found Don's *P. s. horizontalis* almost exclusively or largely prevalent, having by their more rapid and larger growth overtopped and destroyed most of the others, which were only seen in excess where the soil was surcharged with moisture or from other unfavourable causes, and where consequently they were thinner and had more room for developing their characteristic appearances. In places where all the varieties were intermingled the greater abundance of cones on the dwarfer, as well as more fastigate or upright branching trees than on those of the *P. s. horizontalis*, was very marked, showing the accuracy of Don's opinion, that the degeneracy of the Scotch fir in low country plantations was in consequence of the best native variety producing its cones more sparingly than the others, while they were also less easily got at, and the seed gatherers, being paid for quantity alone, seizing upon those cones most easily obtained."

## PECULIARITIES OF THE PINE.

THE pines, or rather the cone-bearing family of trees (the Coniferæ), are very distinct from other vegetation in a great many of their ways and habits, as well as in structure. While they resist more than deciduous trees in some particulars, they succumb to other conditions which the broad-foliaged sorts endure. They will not sprout again when cut down, having no latent buds on collar, stem, or roots, which can serve as a reserve resource. Nor will they abide any cutting, or even mere external drying of the roots; all that are so cut perish, and only the smaller or shorter roots which remain entire to their ends can continue to absorb and supply watery sap and receive accretion of growth from the sap sent down from the leaves. The deciduous larch shows these peculiarities as well as evergreens. But while so tender in these particulars, the conifers will endure external rubs and strains that are fatal to other trees. We often see whole stretches of pine among which there were once growing oaks, hickories, and all that tribe. These have been exterminated by fires which have scorched, but not killed the pines, and left them completely dominant—masters of the situation. So old pines that have been cut and rubbed until they shed tears of turpentine from every one of a dozen great scars, still continue a healthy growth, though pitiable objects to the sight. A very remarkable case of the endurance of a Scotch pine, when wounded, as one would think, to death, is to be seen on the grounds of the Hon. Fielding Beeler, of Indianapolis, Ind. The tree was girdled by the destruction of all the bark from 15 in. of its trunk when measuring 12 in circumference. The mischief was done by "sap-suckers." The branches and stem above the injury have continued to grow and thrive, but below it they have made scarcely any growth, and only two branches out of six or eight have been left below the girdle. The tree has maintained its bright green, and has made as much growth laterally, though not in height, as other trees around it. The secret of this extraordinary power of endurance and recuperation is no doubt that all the external pores of the wood were filled with a varnish of resin soon after the wound was made: the date at which it was made was favourable to the quick formation of this sealing up, and prevention of all wasteful flow—probably about August. This varnish only fulfils one service of the bark, however—that of supplying a water-proof epiderm, preventing desiccation. It cannot aid in the digestion of sap, nor can it well convey what has been digested above to be distributed to the stem and roots below. As the stem has enlarged below the girdle to some extent, but the branches below the girdle have dwindled, the case seems to corroborate the views of those who believe that the ascending crude sap mingles into itself as it ascends some of the rich prepared sap which flows downwards, and thus becomes the richer the higher it ascends. The girdle is now but about 12 in. long, a lip of new growth having covered about 3 in. of its upper portion, and the only visible exudation of resin is a little from the edge of this lip. By the study of such cases we learn lessons like those which the hole in Alexis St. Martin's stomach supplied to human physiologists.—*Industrial World.*

## ALDERS.

MOST distinguished, if not best, is the cut-leaved imperial alder, *Alnus glutinosa* (or *imperialis laciniata*), the charms of which have almost received their due meed of attention, considering that near relatives have been so neglected. It is unquestionably an elegant tree; cut-leaved, vigorous, and refined in contour, and of good size withal. Many soils suit it admirably, especially in the interior of the country; but in sandy, dry soil it often loses its lustre of foliage during summer. *A. glutinosa*, the common European alder, is not specially superior to our common American alder (*A. serrulata*). Some of its varieties are very beautiful, notably *A. glutinosa aurea.* Like many golden and variegated varieties, the golden alder has not in all cases proved as enduring, summer and winter, as its parent. The *A. glutinosa* also presents other peculiar forms, such as the distinct oak-leaved and thorn-leaved kinds (*A. glutinosa quercifolia* and *A. glutinosa oxyacanthæfolia*). I will only say of these kinds that they are worthy of their distinguished connections. The Japanese alders are especially fine, with tree-like habit, conspicuous fruit, and rich, shining green foliage, retained late in the autumn. Among alders they are hardly to be surpassed as ornamental plants.

Up to this point, all kinds of alders mentioned have been conspicuous for distinct ornamental qualities, fitted to distinguish them in isolated positions. I would not rank them as high, ornamentally considered, as their relatives the birches, but they form, nevertheless, ornamental material of excellent quality. Japanese alders illustrate conspicuously the close likeness to each other borne by many Eastern, Asian, and American plants. For instance, in Japan and along the Amoor River we hear of *Alnus incana hirsuta*, and an *A. viridis*, almost identical with our own species of the same names. Passing to the more common though equally worthy kinds, we come to the mountain alder (*A. viridis*), a somewhat inconspicuous species; the common American alder (*A. serrulata*), and the speckled alder (*A. incana*), all, be it noted, American species. The effect of these varieties of alder in mass (as they should be) is not notably different one from another. One, *A. incana*, has the most distinct greyish spots on the reddish brown or bottle-green stems and leaves, which are never downy, but specially shining. Another, *A. serrulata*, is perhaps the best, because the most generally successful under all conditions. This species, on the other hand, has downy young leaves, and foliage noticeable for blunt or rounded points. Other species have usually acute leaves. One variety of *A. incana*, called *glauca*, is more blue on the under side of the leaf than others. There are also dwarf varieties of *incana* and other species. *Alnus cordifolia*, native and common in Italy and the south of France, is hardy, but in character it does not differ remarkably from other alders.

All alders have alike grey, curious-looking bark and shining green foliage, and at least in two cases—that one great charm of alders—golden purple tassels 2 or 3 in. long. These are warmed into life by the earliest breath of spring, and present special charms amid the yet dormant foliage of that season. They were formed in the autumn, and seem only to await a prolonged breath from the south to hang out their small banners as a glad harbinger of settled spring. Later on the flowers appear, but these, in several species, are inconspicuous. Early spring is the heyday of the alder's beauty. Alders should be used in quantities along the banks of streams and pools, where their vigorous roots help to retain solid land in spots most liable to cave. How ornamental, too, the low waving green foliage of the alders thus situated, as their course follows that of the stream through long stretches of green and level meadow!

In connection with alders I should like to say a word about certain species of winterberries or black alders, *Prinos verticillator*, *P. lævigata*, &c. Properly classified, they are hollies; but, never mind, they look like alders and are unfairly neglected—two qualities which give them an equal claim with the alders on our attention. *P. verticillator* is a handsome shrub, usually 6 to 8 ft. high, with thickly crowded branches and shining leaves, which are acute at both ends, and the wood of growths of different ages passes from bright green to pearl-green, and so into still darker tints. It is a clean, thrifty, shining shrub, doing well in upland, but still better in moist spots. Its crowning beauty, however, is its crop of orange-scarlet berries, retained throughout the autumn quite into winter. Numerous white flowers in June lend it a later charm. *P. lævigata* is another species, bearing, if possible, brighter berries, which are retained even throughout the winter. The leaves are very shining. *P. glabra* is evergreen and American, but is less hardy and otherwise valuable. This is a brief consideration of the ornamental qualities of alders, but in one sense it is enough. It must be certainly evident that the landscape planter is sadly neglecting his opportunities when he fails to employ such excellent material as the alders.—S. Parsons, jun., in *Albany Cultivator*.

## FENCES AND FENCING.

I wish to say a few words with regard to the "*barbed wire* fence" question. With all the figuring on this point, I find no showing describing how it is possible to build a *lawful* fence with wire. It would be a grand thing for the country if this could be done, *but it cannot* unless 7 to 10 wires are used. Even then I doubt whether it would turn pigs, and any fence that will not do that is not the thing for a majority of farmers to adopt. I could give you facts and figures to substantiate what I say, but do not wish to be tedious. I own a snug little farm of 82 acres here, and I have at least ten different kinds of fencing on my place, "barb wire" included, so I know of what I speak. Whenever any man can show me how to build a wire fence that will be pig-proof, then I will adopt the plan, even if it cost one-half more to construct it, for in the long run it will be much cheaper than wood fences. Meantime we must be content to get along the best way we can. A good fence can be constructed in either of the following ways—fence-boards 16 ft. long; posts 8 ft. apart:—

| 3 Boards and 2 Wires. | Or 3 Boards and 2 Wires. |
|---|---|
| 3½ inches to first board. | 3 inches to first board. |
| 6-inch fence-board. | 6-inch fence-board. |
| 3½ inches to second board. | 3½ inches to second board. |
| 6-inch fence-board. | 6-inch fence-board. |
| 6 inches space. | 5 inches to third board. |
| 6 in. board. | 6-inch board. |
| 10 inches to first wire. | 9½ inches to first wire. |
| 13 inches to second wire. | 13 inches to second wire. |
| — | — |
| 54 in. total height. | 52 inches total height. |

The law in this State (Wis.) requires fences to be 4½ feet high, or 54 inches, but I would be willing to risk a wire fence 50 inches in height, thus:—50 inches to top wire, 37 inches to next, 27 inches to next, 19 inches to next. The bottom space of 19 inches left can be managed this way: Make portable pieces of fencing by nailing two 4-inch wide fence-boards on to stakes, and driving them down at bottom; they can be taken up at pleasure. True, a fence of three or four wires will do for cattle and horses, and may be a good thing out in Texas or Colorado, and other western States and Territories, but for general adoption it is not the thing, because you cannot construct a perfect or lawful fence with it. As to the present forms of barb wire being dangerous to stock, I have only to state that whoever says so does not know what he is talking about. I have two horses that stick their heads over and between the top wires of my fence, only 11 inches apart, and crowd them down and reach at least a foot on the other side the fence, and eat the crop close to the ground, and I have seen cows do the same, and I use the Frentress wire, which is perhaps the severest kind manufactured.

There is not a single form of barb wire at present in use that is half *barbarous* enough. My stock have never received the least damage from the wire, and I do not believe they ever would, were the barbs ten times as severe; in fact, we need a more severe barb wire introduced, and then we may hope to make a pig-tight fence by putting three or four wires pretty close together at the bottom of the fence.—ROBERT WOOD, in American Agriculturist.

# Remarkable Trees on Methven Estate, Perthshire.

THE following interesting account of three remarkable trees growing on the Methven Estate is given in an article on the "Woods and Forests of Perthshire," in the *Perthshire Constitutional*:—

"There are still three remarkable trees to be noticed on the Methven Estate, and these are by no means the least interesting. The first we shall notice is the celebrated Pepperwell oak, in the park in front of the Castle, and is so called from its proximity to a refreshing spring bearing the aromatic name by which the tree is designated. Special reference is made to this tree in the New Statistical Account of the parish, where it is described as 'a tree of great picturesque beauty, and contains 700 cubic feet of wood. The trunk measures 17½ ft. in circumference at 3 ft. above the ground, and its branches cover a space of 98 ft. in diameter. It has attained an increase of girth of 3 ft. since the year 1796. In the year 1722, 100 merks Scots were offered for this tree; and tradition reports that there is a stone in the heart of it, but, like the Golenos oak, it must be cut up to ascertain this.' In 1867 the tree girthed 21 ft. 7 in. at 1 ft. from the ground, and 19 ft. at 6 ft. from the ground. The tree has grown very considerably since the publication of the New Statistical Account, and even since 1867. At 1 ft. from the ground it now girths no less than 23 ft., and at the narrowest place, about 5 ft. from the ground, it has a circumference of 19 ft. 5 in., being 2 ft. more than at the date of the publication of the New Statistical Account (1837), when it was measured at 3 ft. above the ground. The tree is growing by the side of a steep bank, so that the length of the bole is somewhat irregular. On the upper side the bole measures only about 8 ft. in height, while on the lower side it has a height of 10 or 12 ft. Four immense limbs start from the bole, and a fifth was broken off some years ago. The tree is, altogether, about 80 ft. in height, and is in every respect a noble specimen of the 'brave old oak.' It is known to be over 400 years old, at least.

"The second of the trees to which we have referred is the ash known as the Bell Tree in the village churchyard, so called, we presume, from the bell of the ancient church having at one time been suspended from its branches. Its age is unknown, but it may be computed at about the same age as the Pepperwell oak. It is highly probable that it was planted about the time that the ancient church was built in the year 1433, when Walter Stewart, Earl of Athole, then proprietor of the barony of Methven, formed the church of the barony into a Collegiate Church, which it continued to be down to the Reformation. Part of this old church is still standing; and up till now, although it will not continue to be so any longer, it has been used as a burying-place by the Methven family. The portion of the old edifice still standing is the aisle, on one of the walls of which there is a stone showing its connection with Royalty. The stone has the Royal Lion of Scotland sculptured upon it, with the crown above, and some Saxon inscription below, but the letters are so worn by the tooth of time as to be illegible. It is believed that this portion of the ancient building was erected either by Margaret, the Queen Dowager of James IV., and eldest daughter of Henry VII. of England, when she resided at Methven Castle, or, as is perhaps more probable, by Walter Stewart, Earl of Athole, who endowed the church with lands and tithes. Being a son of Robert II., he was also a member of the Royal Family, and entitled to place the emblems of Royalty upon the building erected under his patronage. Supposing the Bell Tree was planted about the time of the building of the old church, this would make it close upon 450 years old; of which venerable age it bears every appearance. The New Statistical Account says that 'at 3½ ft. above the surface of the ground, this tree measured 20 ft. in circumference, and it contains in all 380 cubic ft. of timber. Forty years ago it exhibited a magnificent top, but wearied, as it were, of its former pliancy, it now chooses rather to break than bow, and yearly it does homage to the soil which nourishes it by surrendering a portion of its withered branches.' The tree has continued to decay since this measurement was taken, and, although it still gives birth to luxuriant foliage, it has an aged and decrepit appearance. It may, however, still live for several generations, but Ichabod is written upon its venerable head. At Tippermallo, near Methven, is the third remarkable tree, also in its dotage—a black Italian poplar. It is not nearly so old as either of the two foregoing trees, having been planted in 1776. It is, however, a very large specimen of this quick-growing species, although recent storms have lessened its stately dimensions. In 1836 it girthed 11½ ft. at 3 ft. from the ground, and measured 300 cubic ft. in solid contents. It now girths 20 ft. 7 in. at the base; 17 ft. 10 in. at 2 ft. from the ground, and 15 ft. 9 in. at 5 ft. from the ground."

# The Eucalyptus in Italy.

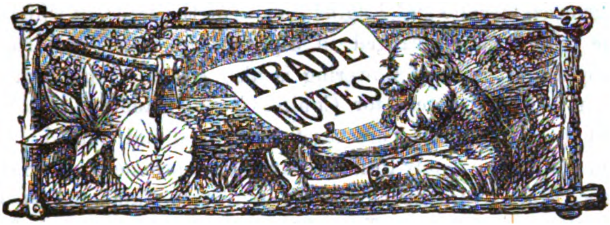
The Naples correspondent of the *Times* writes:—"This as lovely as healthful tree is destined to play a great part in the improvement of Italian soil. Senator Torelli, in his project for draining and improving the malaria districts through which so many Italian railway lines run, indicates the planting of the eucalyptus as a principal means to this end. In North Italy the eucalyptus amygdilina has succeeded well in ex-exposed places. A most magnificent example of this species may be seen in the garden of Prince Troubtzkoi, near Intra. The tree is only ten years old, and already measures about 5 ft. in diameter and about 60 ft. in height. In 1874 the railway company Alta Italia planted 462 trees at Ventimiglia, since which time the sanitary condition of that place has greatly improved. A Florentine lady made a large plantation of various species of eucalyptus near Viarregio; and it was found that the urnigera and viminalca, the meliodora and resnifera as well as the adult globulus bore the climate well; At Grosseto and Orbetollo General Ricasoli planted sixty-eight species of eucalyptus, most of which succeeded well : and at Santa Severa, one of the unhealthiest of places, the globulus has already had a beneficial effect. In the hanging gardens of Prince Aldobrandini, at Rome, there is a globulus sixteen years old and 60 ft. high, with robust branches 30 to 35 ft. long, a development which sufficiently proves that the tree cannot only exist, but prosper, in Rome. The largest field of experiment, however, is the Tre Fontane three kilometres outside Porta Ostiense, where the Trappist monks, aided by the State, have fought a fight against the malaria. In 1668 the air of this place, especially at the monastery, was so deadly that it was found sufficient to pass a night there to catch the fever. The monastery was known by the by-name of the Tomb. In 1869-70 the Trappists made drains, and plantations of the eucalyptus, going during four years to pass their nights at Rome, in which space of time they lost twelve of their number by miasmatic fevers. At the end of four years they could again sleep at the Tomb, and continued their efforts at improvement; and last year a large concession of territory was made to them, with the obligation to plant 100,000 eucalyptus trees in ten years. Senator Torelli defines the eucalyptus as a natural pump, and he is right. From experiments made by the French Government on the hygienic results of plantations of this tree, it is proved that it absorbs ten times its own weight of water, which is returned to the atmosphere in the shape of vapours rich in camphor. A Captain Mignard, who was annoyed by the mosquitoes in Algeria, tried the effect of planting a small eucalyptus in a pot and placing it in his bedroom, and found that it entirely drove away the tormenting insects. The *Temps* publishes the fact that a proprietor in Provence, who had planted many eucalyptus trees on his estate, found that insects disappeared, and his vines were exempt from parasites. Some of his neighbours, following his example, succeeded in driving away the phylloxera from their vineyards. These facts, taken as a whole, completely justify Senator Torelli in demanding that the plantation of the eucalyptus in all the infected regions of Italy should be made obligatory by law."

## THE TREES AND GARDENS OF MOBILE, ALABAMA.

Behind a double team I left Mobile by way of Government Street for the suburbs. This street is the Broadway of the city, and a broadway it is, both in the sense of its width and the noble public buildings and handsome private dwellings which adorn it. The main attraction for me was the magnificent evergreen trees with which the street was lined, and the profusion of these and evergreen shrubs in the spacious and well-cultivated lawns and gardens. Of the trees, the first for breadth, colour, and magnificence were the live oaks; then came the magnolias (*M. grandiflora*), and after them the water oaks, which are not true evergreens, but still evergreen till the last moment. These latter are a favourite street tree in the South, and are preferred probably because of the ease with which they are transplanted, rapid growth, dense shade, and the ability of the foliage to endure all except the severest frosts without being hurt. Of the conifers the indigenous long-leaved pine, the common pitch pine, and the red cedar are most numerous; but in the grounds and largely accompanying them were many new native and subtropical species, like the beautiful and striking *araucaria*, and others which I did not know. Of the evergreen trees and shrubs, the most striking were the orange trees, not round headed and dense, as I had supposed them, but tall and irregular in form and loaded with fruits, which to the inexperienced eye look like large yellow blossoms, so prone is one to think that all oranges must have the true orange colour. Next in size and number were the Japan plum trees (not the new persimmon—*Diospyus kaki*), together with many shrubs like the camellia, cape jasmine, and *Magnolia fuscata*. In the suburbs are hedges of the yaupon (*Ilex cassine*), a straggling evergreen shrub with narrow leaves and scanty foliage, but with every branch laden with brilliant scarlet berries. Presently we stop at the gate of Mr. George R. Rickard, an English gentleman, who, having made a fortune in cotton, has retired to the country. Here I saw full-grown sugar-cane for the first time; cotton treated with special fertilizers, the orange, the fig (as hardy as the oak), the artichoke (*Cynaras solymus*), and the Scuppernong grape.

The day was cloudless, but the air was chilly enough to make overcoats comfortable. Farmers were at work in the fields preparing the land and setting out cabbages, and there were many things to suggest to us the month of April rather than November. The trees in Mobile are not festooned with moss, and for that reason, and from what I saw in other things, I could easily believe Mobile to be a remarkably salubrious city from one end of the season to the other.—B. F. J., in *Albany, U.S.A., Cultivator*.

**Sale of a Small Estate.**—The small estate of Auchengownie, in Perthshire was sold lately to Mr. James Niven, of Plains, for the sum of £4,650.



We have received a good batch of Trade Lists and Catalogues of forest and other trees for the present season, the majority of which are well got up, and we take pleasure in briefly noticing them in their alphabetical order:—

Alexander Andrew, West Shaw-street Nursery, Kilmarnock.—"Catalogue of Forest Trees, Ornamental Trees, Evergreen Shrubs," &c., a small but useful list of seedling and transplanted forest trees, plants for fencing and covert, standard ornamental trees, coniferæ, evergreen and deciduous flowering shrubs, &c. James Backhouse & Son, York, in presenting their extensive "Catalogue of Forest and Ornamental Trees," announce the fact that their stock generally is healthy and well rooted. Their stocks of larch and quickwood are mentioned as being specially strong and fine. J. Cheal & Sons, Lowfield Nurseries, Crawley, Sussex, "Catalogue of Ornamental Trees, Shrubs, and Forest Trees." We have here a good list of coniferæ, ornamental deciduous trees, evergreen, deciduous and flowering shrubs, forest trees, hedge and fence plants, &c. Francis and Arthur Dickson & Sons, The "Upton" Nurseries, Chester, "Forest and Ornamental Trees." A large and select list of seedling and transplanted forest trees, plants for game coverts, underwood, hedges, &c., evergreen and deciduous ornamental trees and shrubs and hardy conifers. The Nurseries of this firm cover some 200 acres, are very bleak and exposed, in consequence of which they announce that their trees and plants are unusually hardy. James Dickson & Sons, "Newton" Nurseries, Chester, "Forest and other Trees, Covert and Underwood Plants, Hardy Evergreens," &c. A good variety of forest trees, plants for game coverts, underwood and hedges, all transplanted; park, avenue, &c., trees, large evergreen trees, hardy conifers, evergreen and deciduous ornamental and flowering trees and shrubs, also standard and weeping ornamental trees. The grounds of this firm are stated to be upwards of 1,000 feet above sea level, and the whole lying high and exposed, the trees and plants are unusually hardy and robust. Little & Ballantyne, Carlisle, "Price List of Forest Trees, Ornamental Trees and Shrubs." A first-class list of seedling and transplanted coniferous and deciduous forest trees, ornamental trees and shrubs. We may mention that the nursery-grounds (130 acres) of this firm are at Knowefield, near Carlisle. Osborn & Sons, Fulham, Sunbury and Hampton, S.W., "Trade List," giving a list of ornamental trees and shrubs, palms, &c., and "Descriptive Catalogue of Fruit Trees," &c., the latter being very complete. Richard Smith & Co.

Worcester, "Tree and Shrub List." A catalogue of evergreen and deciduous trees and shrubs, standard, ornamental and weeping trees, American plants, &c. The generic, specific and English names of the trees, of which there are a very large number, are arranged in alphabetical order, and their native country, height and time of flowering is also stated. This firm have sent us also their "List of Prices for Conifers," and attention is called to the fact that all the plants offered are carefully pruned and trained, lifted every other season and grown singly to make handsome specimens. M. SAUNDERS & SONS, Friars' Walk Nurseries, Cork, "Descriptive Catalogue of Coniferæ, Ornamental Shrub and Forest Trees," &c. We learn that their forest trees are grown on open and exposed land, which produces stout, hardy and well-rooted trees, certain to succeed in any situation. There is a list of shrubs and trees recommended for planting by edges of lakes, rivers and in marshy places. The catalogue also embraces coniferæ, of which their stock is very extensive, no fewer than 95 new or rare species or varieties having been added within the past three years; and there is also a very complete list of standard, ornamental and weeping trees, &c. WOOD & INGRAM, The Nurseries, Huntingdon, "Catalogue of Nursery Stock." This embraces a list of forest trees, hardy coniferous and taxaceous plants, evergreens, deciduous ornamental trees and shrubs, fruit trees, &c. The stock seems both large and varied, and we gather that it is in perfect condition for removal. In addition to the above we have received the following: — WILLIAM BULL, F.L.S., F.R.G.S., &c., King's-road, Chelsea, "A Retail List of New, Beautiful, and Rare Plants." The names and descriptions are given of many beautiful plants which are perfectly new to this country, and comprise introductions from all parts of the world. The illustrations, of which there are a considerable number, have been carefully drawn and engraved by eminent artists from plants introduced at great expense from their native habitats, the collection forming a very interesting one. "A Seed Catalogue" from the same source contains a very full list of select flower and vegetable seeds, lilies, gladioli and other bulbs, interspersed with a few illustrations. DICKSONS & Co., Waterloo Place, Edinburgh, "Descriptive Catalogue of Roses." A very complete list of hybrid perpetuals, in bloom from June until November, is here given, together with a description of each kind, and the prices for standards and dwarfs. RICHARD SMITH & Co., St. John's Nurseries, Worcester, "Catalogue of Herbaceous and Alpine Plants," "Fruit List," and "Rose List."

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**A YANKEE IDEA OF SPORT.**—An American paper states that Mr. William Winans, a Baltimore man living in England, has taken an immense deer forest in Scotland and devotes himself to deer driving. Sometimes he and his sons butcher thirty beasts in a day.

**A Good Gardening Paper.**—The *Garden*, which has for some years taken a high place among gardening papers, has reduced its price from 6d. to 4d. weekly. Some alterations have been made in its appearance, and it will in future consist of forty pages a week, and the coloured plates, which have been justly admired, will be continued.

**French Forestry.**—Industries connected with forest cultivation occupy a prominent place in French resources. The forests cover a space of about 23 millions of acres, of which about one-third belongs to the State and public institutions. The yield is about 26 millions of cubic yards, a great part of which is used for firewood. One of the principal articles is cork bark, the export of which amounts to a large sum, and the consumption of which in Paris alone is about £120,000 per annum.

**Sale of a Lancashire Estate.**—The freehold estate of the late Henry Ashworth, Esq., known as "The Oaks," in Turton, Lancashire, has been sold by public auction. The property consisted of the mansion, gardens, plantation, two farms, and several cottages, the total area being a little over 92 acres. The cottages produce a yearly rental of £62 12s. 4d; the farms £260 a year, and the ground rents £28 8s. 10d. per annum. The bidding commenced at £15,000, and after some spirited competition, the property was knocked down to Mr. F. Bower, of Chichester, for £21,000.

**Trees in Towns.**—Bearing on the question of trees in towns, Dr. Phené remarked as follows at the Social Science Congress:—"To the occupants of houses in streets having a northern aspect, the glare of reflected light is injurious; but the effect would be much modified by the coolness to the eye produced by the green of trees. In ancient surgery, persons having weak or declining sight were advised to look at the emerald. In the old style of building, the streets being narrow, were both cooler, from the sun not being able to penetrate them with direct rays, and less subject to noxious exhalations from the scouring and purifying effects of the searching air to which narrow streets were subject, so that while there was no space for trees there was also less necessity. Wide streets, on the contrary, are hotter, and require the shade of trees to cool them, and, as in the case of London, which had so far done without trees in its streets, not only are modern streets compulsorily wide, but the enormous increase in metropolitan buildings renders every sanitary question one of importance; and the chemical properties of trees, as shown by experiment, gives them an important standing on that ground, irrespective of ornament or the pleasure they produce. But that which is important in such localities is more imperatively demanded in poorer districts, on the score of health, as during the last year alone, 21,000 new houses were erected in London, producing four hundred streets, with seventy-one miles and four hundred and sixty-eight yards of promenade."

Tree Jokes.—A Western man attempted suicide, first writing a note to the effect that he was a blasted oak. He survived, and the impression has been revived that he is a blasted nuisance.—*Exchange.* Also that he was a-corned man at the time.—*Philadelphia Bulletin.* It were better that he died, as he is likely to pine away and live a wretched existence.—*Boston Globe.* Let us hope that he will spruce up and never do such a r-ash thing again.—*Marblehead Messenger.* You maple leaf this or not. Whoa, elms.

Lopping Trees in Epping Forest.—Eighteen persons were charged at the Epping Petty Sessions, on November 19, with having injured and destroyed some of the trees in Epping Forest by "lopping" them, contrary to the law and to the award given by an arbitrator some time ago. After hearing evidence, the Magistrates came to the conclusion that the law had been broken, and inflicted a nominal fine, which, they hoped, would have the effect of preventing persons in future damaging the trees of the forest. The City Solicitor intimated that all that was wanted was to vindicate the law, and that there was no desire that the process of recovering the fines should be put in force.

The Baobab Tree.—One of the largest trees known is the Baobab, of Africa and Madagascar. Its trunk is generally from 15 to 60 ft. high, and from 70 to 75 ft. in circumference, although stems have been measured as much as 30 ft. in diameter. The lower branches extend horizontally outward, frequently to a distance of 60 ft., often hanging to the ground and concealing the trunk. The leaves are large and abundant, and of a dark green colour. The flowers are white, and the fruit soft and pulpy. Of the fibres obtained from the outer bark the natives make cordage. The wood is light, soft, and of little utility. A curious pecularity of this tree is that scarcely any injury will destroy it. Fire scorching the exterior does not impair its vitality. Nor can it be injured from within, as it is quite common to find it hollow. Even cutting down does not exterminate it, for it continues to grow in length while lying on the ground, and its roots, which reach 40 or 50 yards from the trunk, retain their vitality. Although the tree attains an enormous age, Livingstone having examined one which he judged to be 1,400 years old, it is attacked by a disease which affects its woody structure, so that in course of time its own weight causes it to fall in a mass of ruins.

Milk for Fowls.—A correspondent of the *American Poultry Yard* gives the following bit of experience:—"A neighbour of ours, whose hens, to our exasperation, kept on laying when eggs were forty-five cents per dozen, while ours persistently laid off during the same season, on being questioned, revealed the fact that his hens had had a pailful of skimmed milk each day, and no other drink. On comparing notes we found that our management of our fowls was almost exactly alike, with this single difference,—a difference that put many a dollar to the credit side of his ledger, while our own was left blank during the same period; and this thing had been going on for years, with a result always in favour of a milk diet. In cases where milk is plentiful, and only a portion is needed for fowls, it would be well, say once a week or oftener, to give the milk in the form of curd, by heating it until the whey separates from the more solid portions. This is very nutritious, and its constituents so nearly resemble the white of an egg that egg-formation must naturally follow its use. Let no one hesitate to take from his waste milk whatever his hens will use, assured that they will yield five times over the returns that swine or any other stock would give for the same amount."

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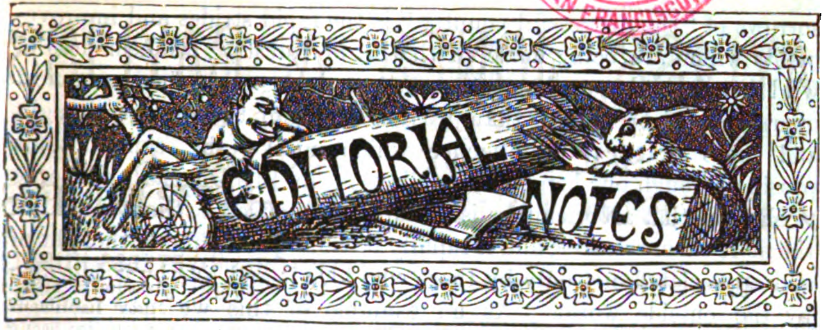

OF the many indications which we receive at this season, reminding us that the year 1880 is retiring from the stage, and that its successor is waiting to make its bow, there is perhaps none that we welcome more, or which it gives us greater pleasure to reciprocate, than the New Year's wishes of our readers and contributors.

It is curious how leniently we are all disposed to judge the dying year, and what wonders we expect from the coming one! We remember, at this time last year, it really was a matter of some difficulty, and it required the free use of all our sympathies to say a good word for 1879; bad it was, and bad we were obliged to write it down. In marked contrast stands out the year just ended, in which the most confirmed grumbler must admit an improvement in commerce, in weather, and we think we may add, speaking generally, in agriculture and arboriculture. Of course, 1880 has had its drawbacks; many a forester could tell us woful tales of "blight, bug, and blister," of diseased beech as well as larch, while here and there we have heard of situations lost through the reduction of expenses consequent on loss of rents—although these instances, we are pleased to add, have been far less numerous than during the preceding year.

In Ireland, too, the disturbed state of the country has almost entirely arrested any extensive planting, but we are in hopes that when life and property have again become secure, and subject to that protection which is usually extended to the inhabitants of civilized countries, it will be recognised that tree-planting is one of the keys for the solution of the Irish difficulty; and that the growing of timber can afford profitable employment to labourers and a fair return to proprietors in many places where other crops are failures. We hear that there is a Syndicate being formed with a proposed capital of ten millions, to buy up land in the West of Ireland for farming purposes, and we shall lose no opportunity of bringing our views on this subject under the notice of the promoters of it.

A far more pleasant subject, however, to contemplate than the sorrows of "the distressful country," is the rapid strides and improvements which are being made in the art of forestry; we hear less of wild theories and more dangerous practices in regard to the commonest operations of the forest than we used to, and the greater thought and more practical intelligence which marks the contributions passing through our hands for publication in this *Journal*, all serve to show us that arboriculture is steadily raising itself to the standard of the more exact sciences, and is rapidly becoming more highly thought of and appreciated, not only by those who love it and live by it, but also by the outside world. As an example of this we may mention that a very few weeks ago we received a letter—in our capacity of editor of this *Journal*—from the authorities of the Royal Agricultural College at Cirencester, requesting us to deliver a lecture on forestry to the students. This courteous invitation we were unfortunately prevented from accepting, but we are quite willing to admit that we received it with a good deal of satisfaction, regarding it not only as a high compliment to the *Journal of Forestry*, but also as a recognition that a knowledge of arboriculture is no longer to be despised, and that in future it will be considered, as it ought to have been years ago, a necessary part of the education of every man who will have the management of land.

Our "Christmas Card," however, is running to an undue length, but before concluding we have just one request to make, and that is that you all, good readers, will do what you can this next year to assist us in our work, both with your pens, by sending us your experiences on all subjects, and with your voices, by inducing your friends and neighbours to read the *Journal*. There are still hundreds of foresters whose names we do not find amongst our list of subscribers, and who are every year losing more valuable and useful information than they can obtain in a lifetime from any other source. If every reader who receives our New Year's wishes will resolve to send us one new subscriber we shall be enabled to make our *Journal* much more valuable than it is now, besides greatly extending the sphere of its usefulness. Nothing, then, now remains to be said but to wish to every reader—each in his own particular sphere—a New Year full of happiness, health, joy, and prosperity and success in all his operations; all this we do most heartily, and at the same time beg to thank our many friends for their kind assistance and good wishes.

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DURING the present month, as announced in our advertising columns, the annual examination of candidates for Appointments in the Forest Department of India is to be held, "for the selection of six young men to be trained in France, for the Forest Service of India." We regret that the announcement carries no hope or interest with it to any of our practical readers, simply from the fact that the terms are utterly beyond the reach of any forester in this country. He can educate his sons at several of our Universities, so as to qualify them for the Church, the Bar, or any of the learned professions, and does so; but the means at his disposal are totally inadequate for the expenditure he must necessarily incur, if he desires to put forward a son to be trained for the Indian Forest Service. This enormous expenditure for the training of a young man appears to be unavoidable, so long as we are under the necessity of sending our foresters to be trained abroad, and until a proper institution is established in this country for the education and training of our foresters, the young men best qualified to fill the Indian Forest Appointments, from early training, natural tastes, and physique, are effectually excluded under the present system. We cannot think that it is the intention of the Government to exclude such a valuable class of men by the prohibitive terms at present in force, and we hope that the system will be so modified that the best men which the country can produce may be obtained for such an important service.

In the meantime, it is advisable for those who can afford it to make the best of the opportunities at their disposal, and enter with spirit into the competition. The system may be, and undoubtedly is, faulty and expensive to the candidates and the country; but there is no alternative, and those who wish to enter the Forest Service must submit to the measures enacted for their training, until wiser counsels prevail and a better and more economical system is inaugurated. The appointments are of a highly desirable and attractive nature to young men possessed of a vigorous constitution and active habits, with a taste for the amenities of Indian life. For such men the opportunity is an excellent one, and we trust that there will be no lack of competitors at the forthcoming examination, so that the selected candidates may be alike creditable to the country that produces them, and the important offices they will ultimately fill.

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WE have again before us the Annual Report of the Commissioners of Her Majesty's Woods and Forests and Land Revenues, giving an account of the income and expenditure of that Government Department for the year ending 31st March, 1880. The details fill a Blue Book of 183 pages, and furnish a considerable amount of interesting information concerning the management of the extensive property owned by the Crown, and the amount of public revenue derived from it. The amount paid into the Exchequer by the Department during the year amounted to £390,000, being £20,000 less than the sum paid in during each of the three preceding years. This decrease is principally attributed to the allowances made to agricultural tenants, in consideration of the losses sustained by them from a succession of adverse seasons, which amounted altogether to £16,869 12s. 10d. during the year; and also to the increased deductions made by the Crown tenants from their rents, amounting to nearly £3,000, owing to the augmentation of the property tax. For the purposes of management the Crown property is divided into two parts, respectively under the charge of Mr. Gore and Mr. Howard. Taking them in the order they are given in the Report, we find that the property in charge of Mr. Gore consists of (1) Windsor Great Park, plantations, and property at Ascot, Bagshot, and Virginia Water, &c.; and (2) manors, messuages, land, &c., in various parts of England. That in charge of Mr. Howard consists of the Royal Forests and the greater part of the plantations in England, and the Land Revenues in Scotland, Ireland, Wales, and in the Isles of Man and Alderney.

From the details given by Mr. Gore, we learn that Windsor Great Park, and other property included in the first head under his charge, extends to more than 14,000 acres of land, maintained as part of the domain attached to Windsor Castle. This property, like the Royal Parks at London, is so largely used by the public for recreation and other purposes of much benefit to the nation, that the income and expenditure connected therewith cannot be looked at solely as a mere matter of profit and loss. During the year the sales of produce—bark, poles, cordwood, fagots, &c.—amounted to £1,665 19s. 3d.; value of timber used for buildings, &c., £528 6s.; rents of land, cottages, &c., £1,652 5s. 7d.; miscellaneous, £7; sales of live stock, &c., in the Ranger's Department, £1,034 9s,; and £130, rent of grazing in the Home Park—the income altogether amounting to £5,017 19s. 10d. Against this, the expenditure amounted to a total of £25,734 8s., comprising, among other items, salaries and allowances in the Ranger's Department, £2,590 15s. 11d.; salaries and allowances in the Woods Department, £1,555 13s. 8d.; re-planting at the Long Walk, £884 0s. 5d.; new plantations in the Home Park, £288 11s. 4d.; seeding plantations at Wishmoor Cross, Bagshot, £47 3s. 9d.; repairs and maintenance of roads, drives, fences, and care of plantations, grass-lands, &c., £7,564 9s. 10d.; repairs and maintenance of lodges, &c., including royal stables, kennels, &c., £4,087 4s. 6d.; rents, tithes, and taxes, £1,354 7s.; food for deer, £228 18s. 3d.; food for game, £500; and the preparation of produce for sale, £614 11s. 5d.

The property described under the second head in Mr. Gore's charge, consisting of manors, messuages, and land in various parts of England, extends to about 70,000 acres of land let for agricultural purposes;

about 600 houses let at rack rents; about 4,800 houses built by Crown lessees upon land let on building leases; collieries and other mines; and numerous small miscellaneous premises. During the year the gross sum received from these subjects amounted to £353,659 4s. 3d. The arrears of rents and royalties due, and remaining unpaid at the end of the year, amount to £10,156 12s. 2d., an unusually large sum, arising chiefly from the depressed state of the agricultural interest and rents being allowed to remain unpaid for a longer period than usual; but it is satisfactory to learn that only in three cases do the arrears amount to more than one year's rent, showing that the Crown tenants are not heavily pressed with high rents. The cost of collecting the rents and royalties upon this extensive property, bringing in the gross sum of £353,659 4s. 3d., and of the agency and local management of the several manors and estates, including the superintendence of the construction of new farm buildings, repairs, and drainage works, amounted to £11,293 10s. 6d., or little more than three per cent. on the receipts; a very moderate cost, even although said to be higher than usual.

Coming to the part of the report which deals with the portion of the Crown property under the charge of Mr. Howard, we find a somewhat different state of matters prevailing. The way in which the public property in the New Forest has been frittered away and unjustly interfered with by the legislature, to the detriment of the public interests, is unsatisfactory and ruinous to an unparalleled degree in these times of fair dealing and enlightened intelligence. By the ill-starred New Forest Act, 1877, the Houses of Parliament devised the national interests in the 63,000 acres or thereabouts, of land comprised in the New Forest, to the adjoining landowners, commonly called "Commoners," who are now using it for their own special benefit in open defiance of the national interests and rights of the Crown in that extensive and most valuable property. This they are supported in doing by the disgraceful and one-sided Act referred to, which was rushed through the House of Commons in a time of great public excitement upon other questions and passed into law in defiance of the clear and judicious report and earnest appeal of the Crown authorities, who knew the real facts of the case, and the true state of matters between the Crown's just claims (representing the public interests) and the avaricious greed of the "Commoners." The loss thus recklessly incurred to the nation is ably dwelt upon in this report, in which the Commissioner says:—"It should be borne in mind that the soil and freehold of the New Forest are in the Crown, subject only to the rights of Commoners, and the pasturage not used by the Commoners themselves in the exercise of their rights is therefore the exclusive property of the Crown, and any income which may be derived from it belongs to the Crown and the public. The Verderers as constituted by the Act of 1877, are practically the nominees and representatives of the Commoners; but, even admitting the theory that they are also officers of the Crown, whose duty it is to maintain the rights of the Crown as well as those of the Commoners, their expenses, for which they require funds, are incurred almost exclusively in regulating and maintaining the rights of the Commoners, and it is not equitable to farm the pasturage of the forest (which belongs to the Crown, subject only to rights of the Commoners to depasture their own cattle) for the purpose of raising funds for the payment of expenses which the Verderers may incur in regulating and managing the rights of the Commoners. By the Act of 1877, a right to depasture the forest for about six months in each year was conferred on the Commoners, on payment to the Crown of a sum of £1 per annum. By the Bill of 1879, it is proposed to confer on other persons, living outside the forest, and not being entitled to rights of common over it, a share of the pasturage of the forest during the whole year, on payment, it is presumed, of substantial rents, no portion of which will be paid to the Crown or the public." That such a statement should be necessary, shows a deplorable neglect and want of insight among our public men, to whose keeping and watchful care the rights and interests of the public are committed. The result is, that from this extensive and valuable property owned by the Crown for the nation, the public derives, for the year in question, only the insignificant sum of £3,242 11s. 11d.; being at the rate of about one shilling per acre; which we may remark is, from accidental causes, much above the average of previous years. A more unwarrantable waste of public property can hardly be imagined, and the attention of public men is urgently required to see the national rights asserted, and the just claims of the Crown and the Commoners honestly and fairly adjusted.

The receipts and expenditure of the other royal forests and woodlands point to a somewhat better state of matters; but none of them appear to be realizing to the public anything like their real worth under careful and judicious management. The Forest of Dean, extending to about 22,500 acres, is credited with an expenditure of £4,596 12s. 3d., against an income of £7,313 13s. 4d.; showing a surplus of £2,717 1s. 1d., or a rental of about 2s. 4d. per acre. Highmeadow Woods have an income for the year of £2,455 3s. 8d., with an expenditure of £1,856 2s. 4d.; leaving a surplus of £599 1s. 4d. Alice Holt Woods require an expenditure of £414 9s., and bring in £1,114 2s. 7; realizing a surplus of £599 13s. 7d. Woolmer Estate produces £709 14s., and costs £88 6s. 4d.; giving a balance on the right side of the account of £621 7s. 8d. Bere Woods are also on the right side of the account by £610 7s., the income being £1,178 10s. 4d., and the expenditure, £568 3s. 4d. Parkhurst Woods produce £467 3s. 9.d, and expend £315 1s. 8d., giving a surplus of £152 2s. 1d. The total sum thus received from the royal forests and woodlands amounts to £23,549 7s. 11d., and the expenditure £15,662 0s. 9d., producing a balance of £7,887 7s. 2d., or equal to a rental of about 1s. 6d. per acre. No further argument is required than these figures plainly show to prove the wretched nature of the laws and system under which the national property is managed, or, more correctly speaking, *mismanaged.*

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FROM the latest received number of our Eastern contemporary, the *Indian Forester,* issued in October last, we are sorry to learn that the editor of that journal has taken offence at the remarks which we have considered it our duty to make from time to time upon the management of the Indian Forest Department, and the worse than useless system that has hitherto been followed by the Indian Government in training young men for the forest service. The term "young *men*" is not ours, as any one may see by a reference to the India Office notice which has appeared in the advertising pages of this *Journal* for several months past; still, it may be offensive to the delicate nerves of the "gentlemanly" editor of the *Indian Forester,* who indignantly scolds us for presuming to recommend the sons of foresters and similar intelligent, hardy, and vigorous "young men," because, forsooth, they are not "gentlemen," as the term is understood in the Indian Forest Department! We do not care to characterise the conduct of the Indian "gentleman" who thus gratuitously insults in the grossest form a most able, honourable, and intelligent class of men—*gentlemen* in the truest sense of the word—neither do we desire to retaliate his wretched vituperation of our aims and motives for urging on the Government the crying necessity for a thorough reformation of the ruinous system on which the Indian Forest Department is at present conducted. We have only to turn to the pages of the *Indian Forester,* edited by this polite "gentleman," for conclusive proof of the rottenness of the system pursued. The number before us contains a most serious complaint, by the Secretary of State for India, of a heavy falling off in the revenue of the Forest Department, "which appears to be the result of increasing expenditure and diminishing receipts." We can add nothing to the severity of the censure of the Secretary of State upon "the recent large and continuous reduction of the surplus revenue of the Forest Department." He concludes his reproof by saying—"I trust that your remarks on this subject may lead to such improvements in the management of the State Forests as will ensure more satisfactory results in future years, and *that it may not be found necessary, in consequence of diminished revenues, to restrict expenditure upon the requisite works of forest conservancy*" ! (The italics are ours.) What a miserable state of affairs these words portray? and they more than justify the severest strictures which we have felt it our duty, in the interests of the public and the Indian Forest Service, to pass upon the expensive and ill-devised system upon which young men are trained for the Forest Management of the Department. The whole system is effete and useless, and must be superseded by a thorough and efficient scheme of British training for the young men, supplemented by a course of training in India, to specially qualify them for the Forest Service, before the Department will ever become the thorough success which it ought to be. The Secretary of State for India will in this find the remedy for the deplorable state of mismanagement which he so strongly condemns, and for the regeneration of which he will call in vain while the present system, which has proved such a lamentable failure, is carried on.

With the individual members of the Service we have found no fault. We thoroughly appreciate their good qualities, which under a more auspicious system of training would have made the Department as great a success as it is a notorious failure. To a few of them, we are indebted for some much appreciated favours, which we are always glad to receive and duly acknowledge. Moreover, our columns are open to any gentleman who may desire to express his views, in a proper manner, upon either side of the question. If our Indian friends have faith in their scheme, we will willingly grant them fair space to expound its merits in the *Journal of Forestry*. Neither fear nor favour shall prevent us giving fair play and justice in these pages to the opinions of any one who has the smallest claim to be heard upon the question; and nothing will stop us from returning to the subject, again and again, till right prevails and truth is triumphant.

* * *

A SUGGESTION has been made by Mr. Alexander Mackenzie, Superintendent of Epping Forest for the Corporation of London, that a School of Forestry should be established in connection with Epping Forest, for which he says there is a combination of circumstances, which it appears tend to a hope of success. In a report made by Mr. Mackenzie to the Epping Forest Committee of the Corporation he says:—"There are about 6,000 acres of land, all more or less forest, neglected, detached, and inharmonious in effect, by reason of its having been, from well-known circumstances, so very much subdivided that an effort must be made as soon as the outlying portions are restored to the care of the committee, to blend them all into one harmonious, albeit diversified, whole. The execution of all these works would form the best possible groundwork for the practical training of the foresters in the future. Added to all the above advantages is the fact that at the present time few, if any, of the woodlands and forests belonging to the English aristocracy are managed with either economy or skill, which would be no longer the case if such a school as is now suggested were in existence in England. There is at present an advertisement by the Indian Office for the selection of five young men "if as many are found qualified" *to be trained in France* for the Indian Forest service. Instead of the present system of educating Indian foresters Mr. Mackenzie suggests that candidates be selected from the middle classes, the sons of farmers, foresters, and other practical men; they should have received a fair education, and possess a little practical knowledge of soils, trees, and botany; their training at the School of Forestry should include practical forestry, mathematics, engineering, and architecture to a limited extent, surveying, levelling, and land measuring, book-keeping and geology, also they should have facilities for acquiring at their option Latin, French, and German. The course of study should extend over four years, the first two to be spent at Epping Forest, the third year on the New Forest, and the fourth year at Windsor, where may be seen the full development of the principles commenced by the student at Epping. After this course of training those pupils who have diligently applied themselves to their studies during the four years should be drafted off to other fields of usefulness, either at home or abroad." Mr. Mackenzie urges the Committee to secure the powerful influence of the Corporation in inducing the Government to assist in establishing such an institution. However, we require much fuller details of the scheme than are at present at our command, before we can pronounce an opinion upon its feasibility, or othewise. The Corporation of London, and Epping Forest, are neither the parties nor the place from which a School of Forestry could be expected to arise, still we are glad to hear that a scheme is on foot, even in such an unlikely quarter, and we will welcome the fullest explanation of the proposal in our pages, if those concerned will avail themselves of our offer.

# Appliances used in Forestry.

BY A. SLATER, LAND STEWARD, WYRESIDE, LANCASTER.

(*Continued from page* 493.)

ON estates that are bounded or intersected by streams or rivers, or part of whose boundaries may be washed by the ocean, there are times when it becomes necessary to form embankments and adopt other means to prevent the currents from working out their regular course and washing away the land. This may be done in various ways, but with strong and deep currents, and especially with the encroachments of the sea, recourse must first be made to piling before an effectual stoppage can be achieved. When such an operation has to take place, for convenience and expedition, and I may say necessity as well, a battering-ram generally called a pile-driver requires to be used for driving the piles, and it will be found useful for other descriptions of work, such as in forming or repairing weirs, driving posts for flood-gates, or in the erection of wooden bridges, &c.

In the accompanying sketches are given designs of two battering-rams, either of which is well adapted for the foregoing operations. In figs. 10, 11, 12, 13 and 14 are shown the component parts of a ram wrought by a rope and windlass; fig. 10 shows its front elevation with side stays, which are 3 in. square, and are secured to the bottom frame by clasps and bolts, and at top by bolts sunk flush with the inside of the uprights, the size of which are 7 in. by 3 in., and may stand about 24 ft. in height, with a space of 2 in. between them, and they can be formed of best red pine or larch. Fig. 11 shows the side elevation with back stays, windlass, rope, clutch-bar (*a*) and block (*b*). The block may be made of beech or iron, and should weigh something like 2 cwt. A piece of oak (*c*), slightly thinner than the space between the sheers, is sunk 3 in. into the back of the ram and projecting 1 in. through the sheers, a piece of the same material 4 in. by 2½ in. is mortised that depth on to this, and the whole bolted together with 1 in. bolts. Fig. 14 shows the form of eye for bolting on to the wooden block wherein the clutch of the lever bar (*a*) is placed when raising the ram; the clutch should be slightly curved upward on its upper face, and ought not to be longer than 3 in.; the length of the lever may be from 5 ft. to 6 ft. with eyes on each end, that in

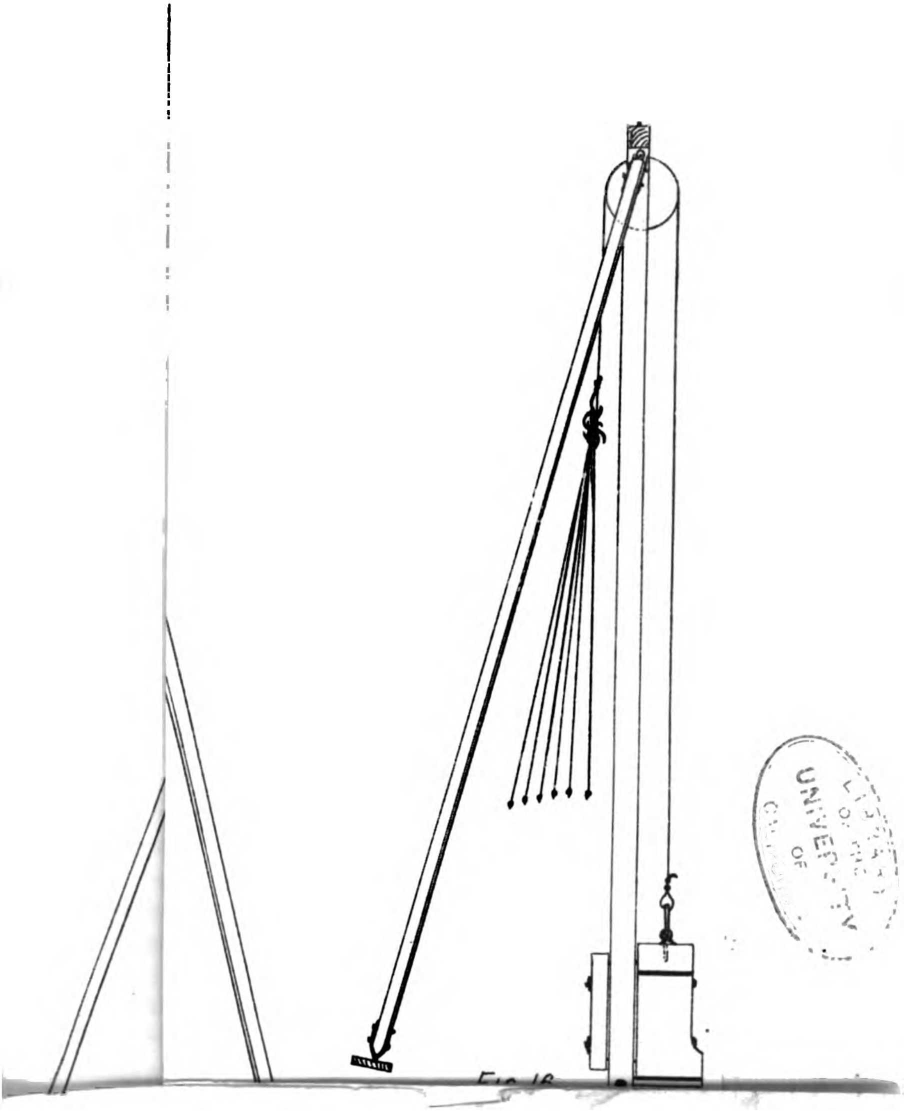

Fig. 16

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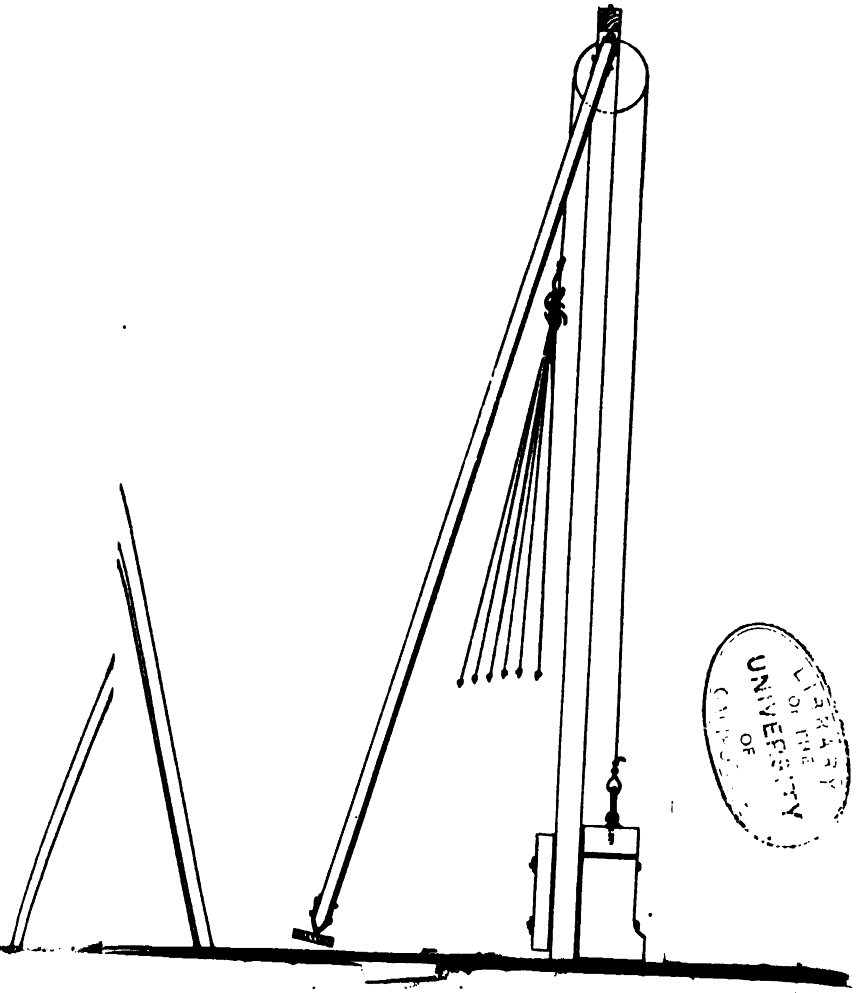
more conveniently placed . .

In fig. 15 is represented a battering-ram constructed on a simple principle than the foregoing. The uprights or sheers are 20 ft. lon by 6 in. square, and are bound together at the top by a cross-piec 7 ft. long by 6 in. square, having near either extremity bolts with eyes a



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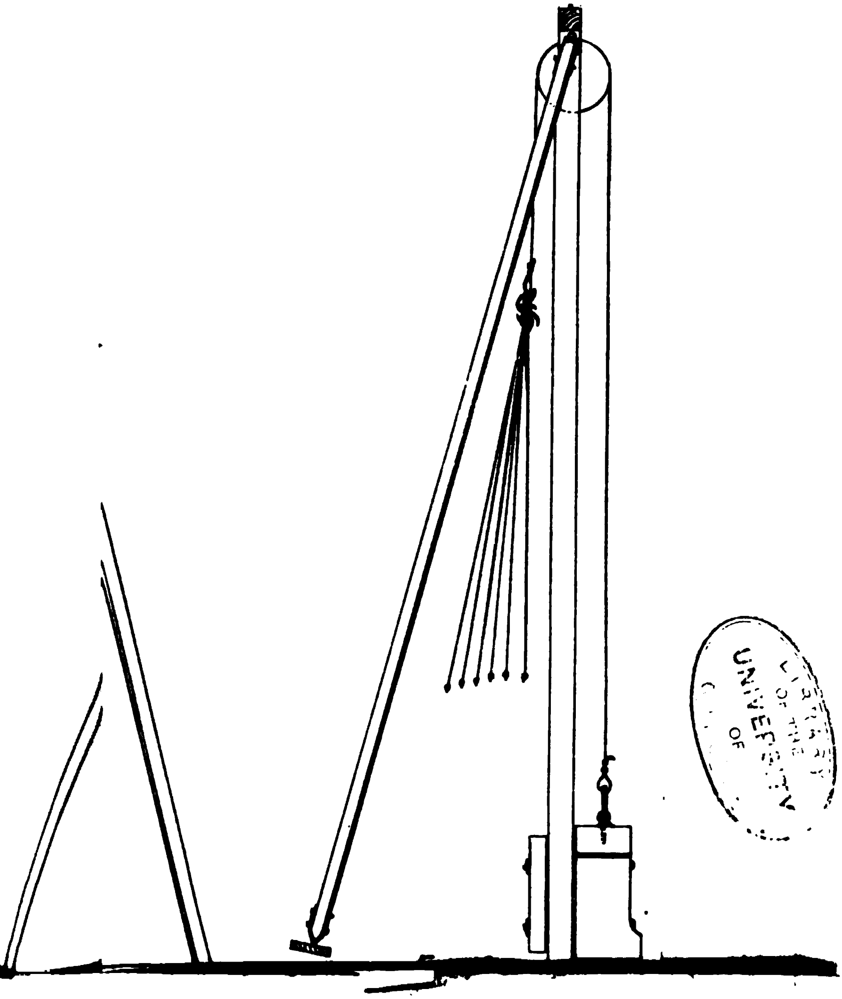

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front for attaching a weight to for balancing it if necessary, and the one on the opposite end for fixing a cord to, to lower that end when it is desired to slip the ram off the clutch. In fig. 12 is shown the ground frame which is mortised and banded together, and it may be of larch 6 in. square with the exception of the middle piece which is 12 in. by 4 in.; (*dd*) shows the bottom of sheers, (*cc*) strong butt hinges 2 in. broad by ¾ in. thick for fixing sheers to frame, (*ff*) bottom of the windlass standards which are mortised into and banded down to the frame, and (*gg*) the position of the back stays which are 3 in. by 2 in. and bolted at bottom and top. In fig. 13 is represented the windlass, the roller of which may be from 4 in. to 8 in. in diameter, but the smaller it is the less power will it take to drive it. When moving the machine it is necessary to raise and allow the ram to hang, and to prevent the windlass from unwinding, two bolts (*hh*) are placed in the standards, so that they can be drawn out to catch the handles, which will stop them from turning round. When using this machine it requires to be set on planks and slid along them when it is desired to change its position, and to steady the sheers when at work, a couple of guy-ropes should be fastened to their top, and secured to a pair of posts driven into the ground for that purpose. The rope for raising the ram, as shown, is fixed to a ring in the top of the lever bar, and passed over the pulley, which should project out so that its front may be perpendicular with the eye on the block, and down to and fastened to the windlass; three or four men will then wind it up until the cord which is attached to the end of the lever becomes tight; the length of this cord should be about 18 in. less than the distance between the ground frame, where its end is fastened, and the underside of the pulley, when by the raising of the block the end of the lever will be drawn down until the ram finally slipped out of the clutch and drops on to the head of the pile; the windlass is then unwound and the end of the lever taken hold of, and the clutch slipped into the eye, when the ram will again be ready for raising. Should a light stroke be at any time required, it is only necessary to pull down the cord until the ram slips off the bar. By fixing a piece of iron about 3 ft. long to the back or top of the sheers, so that it projects outward and downwards, that it may catch on the top of the lever and prevent its end from ascending when raising the block, it will be unnecessary to use a cord. When removing or storing the machine it will be necessary to separate the stays and sheers from the frame, so that it may be more conveniently placed on the carts.

In fig. 15 is represented a battering-ram constructed on a simpler principle than the foregoing. The uprights or sheers are 20 ft. long by 6 in. square, and are bound together at the top by a cross-piece 7 ft. long by 6 in. square, having near either extremity bolts with eyes at their lower ends bolted up through it, into which the back stays are hooked when the machine is set up for work. The bottom of the sheers are secured to a plank, 10 ft. long by 9 in. by 3 in., by bolts and angle irons, and by 3 in. square stays mortised into it and bolted to the uprights. When the machine is in use a second plank, having its ends clasped with iron bands, is bolted to the underside of the plank already mentioned, and it rests on the platform which is requisite for the machine to be placed upon, and the bands on its ends prevent the plank being damaged by the crowbars when sliding it forward. The back stays are 3 in. square and will require to be from 20 to 25 ft. in length and have bands, with hooks on their ends, bolted on to their tops, which, as already stated, are hooked into the eyes in the cross-piece on the top of the sheers. There are also bolted on their lower ends bands with eyes which are slipped on to crooks bolted into a plank, whose length may be 18 ft., and it should be so placed, either at the back or front of the sheers, that the spars may have a sufficient angle to act as stays to steady the machine, and the plank must be weighted with a few blocks of stone to keep it from shifting. The block of this machine is not generally made as heavy as that in the other, nor is the slide between the sheers mortised into it, but along with the retaining piece at its back are merely bolted together. One end of the rope for raising the block is fastened to the ring in its top, and on the opposite end are attached six or more smaller ropes, according to the weight to be raised, and each piece is taken hold of by a man, and the block raised as high as practicable and then allowed to drop on to the pile. By this machine the strokes will be delivered more rapidly than by the one wrought by the windlass, but it requires double the number of men to work it, and the strokes will not be so effective. To allow the ram to slip up and down freely, care should be taken to have the sheers always perpendicular, and they should occasionally be well rubbed with soft soap, and the bearings also should be kept well oiled.

In fig. 17 is shown the form of a piling-bar which is sometimes used for driving into the ground to prepare a passage for the piles. It consists of a strong round bar of iron tapering to a point, with a socket at the top, into which is fitted a piece of tough ash, about 6 in. in diameter, hooped with iron to prevent it from splitting, and a transverse auger-hole is drilled through it so that a small crowbar can be inserted to hold it by when being driven, and to raise it by when taking it out of the ground.

(*To be continued.*)

# The Larch Disease and its Prevention.

By CHARLES FRANCE, Nurseryman, Lanark, N.B.

It would appear that notwithstanding all that has been written and said by practical foresters and others about the larch disease, we have as yet no definite or reliable information on the subject—another mystery, like the potato disease. That early and late frosts are the primary, or at least principal cause of the evil, seems pretty evident. The fact that the native larch (if an exotic can be called a native) resists the disease better than foreign larch points directly to climatic influence as the cause of the disease; and after an experience in horticulture and arboriculture of upwards of half-a-century, with ample opportunities of observation, I see no other explanation of the evil. The fact is not singular. We have of late years introduced a great many new conifers. Some have succeeded admirably in one locality, and entirely failed in another. I do not by any means wish it to be inferred that from this fact or facts we can draw definite conclusions as to the cause of the failure of the larch in some localities, but as it is an unquestionable fact that larch does better in some localities than others, it seems to me that the judicious selection of sites for the growth of larch is the only remedy, or partial remedy, that is at present available. To plant larch in damp, low-lying "bottoms," however well drained, is almost certain to ensure failure. There are certain soils, too, that seem inimical to the growth of larch, and this is the case with most kinds of plants, and therefore not peculiar to larch alone. In laying down plantations I fear that in some cases too little attention is paid to this matter, which even in regard to hardy native trees should be attended to. Nature itself has given us lesson upon lesson on this subject, but the teachings of nature are too often entirely overlooked or but little regarded. Thousands of acres are annually planted without any really practical advice being taken as to the most suitable plants for the particular site or locality proposed to be planted.

The ground is often insufficiently or too recently drained, because forest trees are too often assumed to grow under any circumstances or conditions.

This is a great mistake, and the loss of plants which thereby frequently occurs is far more expensive than the proper preparation of the ground would have been.

There is an operation in many cases much needed, but, in most cases of laying down new plantations, entirely neglected; it is expensive and therefore seldom done, though of the highest importance to the after success of the young plantation. I mean ploughing, or trenching the ground, to the depth of six or eight inches, according to the nature of the soil, twelve months or so before the ground is planted.

This places the vegetable matter of the soil in immediate contact with the roots of the young plants, and is of great advantage in giving the young plantation a good start, and affording a supply of nourishment for years to come. At the end of twelve months a new growth of grass will have come up to afford shelter to the newly-planted trees.

The expense may vary (according as it is ploughed or trenched with a spade) from 20/- to 70/- per acre, but the half at least of this expense may be saved by being enabled to use smaller plants, and after filling up of the plantation being less likely to be required. Old plantation ground with roots in the soil can only be trenched with the spade, while ground free from such roots can be ploughed. A brush-harrow run over the ground after ploughing or trenching partially levels the soil and allows the operation of planting to be more easily done.

The breaking up of the soil and its thorough pulverization is well known to be of great advantage to any crop, whether horticultural, agricultural, or arboricultural, and it is not a little surprising that it has been so generally ignored in the latter branch of rural economy.

Agriculturists go to great expense to ensure a good crop of agricultural produce, in the case of potatoes perhaps as much as £14 or £15 per acre, and not unfrequently they are woefully disappointed in the result. Of course, I admit that there is at least a prospect of an immediate or early return in the case of agricultural expenditure, while in that of plantations it is but distantly prospective, and in most instances "one man sows and another reaps," but the man who plants trees is at the same time often reaping the fruits of the forethought of those who have gone before him, and in this way he is as well off as the agriculturist who sows and reaps for himself.

But the return from plantations is not so distant as to deter men, even of middle age, from the hope of seeing part at least of their expended capital returned to their pockets, while the prospective increase of the value of their property is assured. Whatever we do therefore let us do it well, and give the crop a fair chance of producing a good return. We read that "Tull reaped twelve successive crops of wheat from the same land by the repeated use of the plough and the horse-hoe."

Most soils suitable for particular crops will amply repay judicious labour. The pulverization of the soil in reference to arboriculture is too little attended to. In making an arboretum or some such ornamental ground, the expense and necessity of trenching the ground is not questioned, but to propose to plough or trench ground for an ordinary plantation is looked upon as altogether unnecessary.

There seems little doubt that the price of timber ere long must rise very much. If the accounts we have from America are correct, the supply thence cannot be long equal to the demand; at all events, the districts whence the supply must be drawn are gradually getting further and further from the American Atlantic ports, and long land or river carriage must greatly enhance prices, even if the supply can be maintained, which is more than doubtful. Of course we do not overlook our sources of supply from Northern Europe, but a deficiency in one quarter naturally raises prices in another, and the supply from the Baltic regions must also, under increased demand, run short. There seems, therefore, every reason to expect that money judiciously invested in laying down plantations of timber trees will ultimately be highly profitable. Now, as larch is not only a most valuable timber but also gives an early return, it is of vast importance to intending planters to have as definite information as can be obtained in regard to its probable chance of success in our British forests.

We naturally look to such a body as the Scottish Arboricultural Society to give some authoritative opinion on the subject, but though I was not at their last meeting in Edinburgh, I understand there was still considerable diversity of opinion as to the cause of the disease in larch, and it seems to be taken for granted that until the cause of the disease is ascertained, little can be done to prevent it. Medical men certainly make it a point to find out the disease under which their patient is labouring ere they prescribe for its cure, but it seems to some at least, that our patients are as likely to improve with a change of air as any treatment we can try, that is to say, we should be as careful as possible in selecting suitable ground and situation for growing larch. We have no command over the weather, and as for the bugs, when they appear they take their will of their victims in spite of anything we can do.

Experienced foresters generally seem to think that the native larch is the safest to plant. Admitting that this is really the case, I fear that the present supply is unequal to the demand, not perhaps so much from the want of seed in the country, as from the large proportion of seed that is actually killed in kiln-drying the cones. I lately saw in a large nursery in the North of England, a bed in which I was told 27 lb. of native seed had been sown, and the result was only about 12,000 plants. This was a great loss to the nurseryman and a temptation to use foreign seed in future, which is much cheaper, and gives generally a full crop.

If the Scottish Arboricultural Society could devise some plan to enable nurserymen to get a plentiful supply of good native seed, I feel assured that they would willingly give a fair price for it. Nurserymen are naturally anxious, and indeed it is their interest, to supply the true plant, if it can be obtained.

The losses which some nurserymen have sustained from getting seed that would not vegetate have been very great. The getting of seed true to the name, and of good quality, is one of a nurseryman's greatest difficulties.

In connection with the larch I may mention a fact which seems to me peculiarly instructive. At the bottom of our nursery here the larch plants frequently lose their tops from the frost, while at the top of the nursery, seventy or eighty feet higher, we consider the larch a safe crop, as we seldom lose any.

In plantations, in many cases at least, the result is the same. High rocky glens or hill sides, especially *with a northern exposure*, seem to suit larch best.

If the careful selection of sites were properly attended to, I am convinced that it would do more good in the way of securing healthy larch plantations than all the discussions that have taken place anent early and late frosts and the larch bug. The fact is undeniable that in some localities the larch still grows perfectly well, while in others it fails, and as already remarked this is the case with more kinds of trees than the larch. Old planters were particular in selecting the plants most proper to plant in particular localities, but too many of our modern planters act as if they could force nature and make all kinds of trees grow where they wanted them. "Drain the ground well," they say, "and there is no fear but that most trees will grow."

We admit draining to be a most necessary operation, but it is a mistake to suppose that by thorough draining you *entirely* remove the natural tendency of low-lying ground to draw early and late frosts. Go over such grounds early of a morning or late at night in the spring or autumn when there is a little frost in the air, and you will be convinced of this. Besides, it has been observed that larch does not ripen its shoots so early in the autumn, in such localities, and yet it comes into leaf earlier in the spring, and is thereby exposed to double danger. The larch is naturally a hardy tree. We have seen them growing at a high altitude and making fair propwood timber, while the Scotch firs beside them were mere bushes.

We have had a plague of insects this last summer on several of our trees, notably the beech. There can be little doubt that the long continuance of hot dry weather was the cause of this, for we have seen the same thing happen before under similar atmospheric conditions. We are often for years without such a visitation, and yet when the proper condition of the atmosphere for their advent appears there they are in myriads.

The Scotch fir was also in many places literally covered with a small black spiderlike insect at the same time. This may not have been so generally noticed, as we called the attention of several of our forester friends to the fact before they were aware of any such insects being on their trees, but who afterwards told us that the bark of the young shoots of trees was completely covered by them. These seemed to do little or no harm to the Scotch fir, and a heavy shower of rain almost cleared them entirely off the trees. The leaves of the beech, however, were by this time much injured; some hedges completely defoliated.

The question naturally suggests itself—Was there any peculiarity in the juices of these plants or exudations on their leaves, consequent on the hot dry state of the weather, that invited the attacks of these insects? It is said by some that the leaves were punctured by the insects, and hence the effusion of the honey-like matter upon the surface of the leaves. This may be the correct state of the case, but there can be no doubt that many leaves might have been seen with no insects upon them, and yet covered with this leaf honey. It is indeed common on the oak and the plane and other trees in warm seasons without any insects except the bee tribe being visible upon them to the naked eye.

It is well known that the spores of many of the fungi, though driven by the wind over a district in millions, germinate only when they find their natural habitat. Is it unlikely, therefore, that an unhealthy condition of the juices of the larch, consequent on injury to the immatured or newly-developed leaves of that tree, predispose them to be attacked by the larch-bug, and that the bug is a consequence rather than the cause of larch disease?

We freely admit that when once the bug is established in a plantation, that it will pass from an unhealthy to a healthy tree and do great harm when the trees were otherwise perfectly healthy.

This, however, is only analogous to abundance of cases of disease in the animal kingdom. It is the cause or origin of the disease we aim at discovering, and if that cause can to any extent be prevented by the above suggestions our object will be attained.

# The General Work of the Estate.

BY ANDREW SLATER, Rose Cottage, Loftus-in-Cleveland.

The following remarks are intended for the information of young foresters who may be inclined to acquire a knowledge of the general work of an estate.

The work necessary on an estate will depend upon whether it is for grazing only, or for tillage. Where the former is the case the buildings required are of less extent than those needed by the latter, and the duties of superintendence less onerous. The amount of fencing in either case may not differ, but the kind of fence will depend upon the kind of stock kept on the land, whether horses, cattle, or sheep.

The arrangements made with the tenants on a certain estate often differ widely from those on the estate next it. On one estate the landlord executes all the repairs on the farm buildings, while his neighbour arranges with his tenants to keep their buildings in repair during the whole term of their occupation, and that to the entire satisfaction of the proprietor or his agents. In the latter case it is for the tenant's interest to see that repairs are promptly attended to, and when they can be done at a less cost than if permitted to become a wreck.

Where the landlord keeps the farm buildings in repair the case is widely different; the tenant depends upon the landlord, and it often happens that a small matter that might be put right for a few pence will cost as many pounds before notice be given of anything being wrong. Where this is the arrangement with the tenants the superintendent of works holds no sinecure; he will require to bear in mind that a stitch in time saves nine if he would be faithful to his employer.

Fences are generally put in a proper state of repair by the landlord on the entry of a new tenant, while the tenant on his part engages to keep them in full repair. In some cases wood is given by the landlord for that purpose, either in a rough state or manufactured. It will be the duty of the superintendent to see that the wood is properly applied, and to the purpose for which it was given. On other estates the tenant gets the fences in good repair and binds himself to keep them up without any wood being given by the landlord for that purpose; in that case, where live fences have gaps to be filled up, a sharp look-out will have to be kept that dead thorns are not used for that purpose.

The general work of the estate consists more or less in the erection of fences of various kinds.

### WIRE FENCES.

Wire fencing is largely used on some estates especially for protecting plantations. On many estates however they are not used, and on such young foresters can have no opportunity of obtaining a knowledge of the work connected with their erection.

The cost, including materials and erection, or for materials alone, can easily be ascertained by referring to the price lists sent on application by the various manufacturers of iron fencing; also the strength of fence best adapted for the different kinds of stock.

When ordering wire for fencing it should be strictly understood that any wire which will not tie cold will be returned at the cost of the seller. Brittle wire that will not tie cold is the cause of unnecessary cost in the erection, and no fence of which it forms a part can be considered efficient. Any pressure from stock, or even severe frost in winter will cause it to break.

Heavy wires, such as Nos. 1, 2 and 3, should be knotted slowly to give time to the outer side of the wire to stretch and the inside to contract, otherwise the best wire may break by undue haste.

Hard wire is the best for fencing purposes, as it does not stretch unless exposed to extraordinary pressure. Soft wire is not elastic, but it is easily stretched and is readily affected by the variations of temperature, and therefore should not be used as a sheep-fence.

Cable wire is apt to become slack after being strained, the reason being that the strands require time to come close together. When strained as tight as is considered necessary, it should not be tied until time has been allowed for the strands to come close, when it may be found necessary to apply the screw a second time.

A very good way to secure an equal strain on all the wires in a fence is to have as many keys as there are wires in the fence. They should be made of a tapering shape so that when driven in above the wire in the straining pillar the whole of the wires can be strained before being tied, and any inequality in the tension of the wire can be adjusted. The keys should be made of steel, soft tempered, and hollowed on the under side, and of sufficient length to pass nearly through the standard to enable the workman to drive them out when the wires are all tied, but not before, as he might start some of the wires.

There are various kinds of straining pillars now in use to choose from. Those having winders attached are the best, and also the cheapest in the end.

The fixing of the straining pillars should be the first item in the erection of the fence. If the standard is made for batting into stone it will be necessary to provide stones of not less than 10 cwt. If of hard freestone or whinstone a hole drilled to the depth of 4 in. will be sufficient to fix it, but if of coarse grained freestone a hole 6 in. deep will be necessary. If of a less depth, the strain of the wire might pull out the standard with part of the stone. The stone for the straining pillar should be sunk 3 in. below the surface of the ground, and the earth should be well beaten about it to assist in keeping it down, as the strain of the wire has a tendency to lift it. Self-fixing standards do not require any stones.

A stone not less than 2 ft. long 18 in. wide and 9 in. deep will be required for a stay to the straining pillar to secure it against the strain of the wire. The best form of stay is a straight one. One inch round iron is the lightest that should be used, and that only for fences of the lightest wires. The stone should be sunk in the ground sloping inwards in the direction of the straining pillar, as much as will admit of the stay entering the hole made in the stone to receive it without any bend being made in the stay for that purpose. Bent stays are sometimes used, being more ornamental, but their power of resistance is inferior to a straight one of the same weight, and on account of the labour connected with their manufacture they are more costly.

The stay should be as long as the space between the straining pillar and the next intermediate standard will admit of, and should be placed as near the upper wire as possible, for which purpose a hole should be sunk in the straining pillar not less than ½ in. deep and 1 in. in diameter. It should be made slanting upwards in the pillar to keep a sure hold in case of accidents.

There are various materials used for batting iron into stone. Lead has been used largely, but it is very costly, and where a few inches of hole have to be filled, it cannot be made firm at the bottom, but soon becomes loose. Sulphur is the worst material that can be used. It corrodes the iron, and that rapidly in damp situations.

Cement has not the fault of either lead or sulphur, as it preserves the iron, and adheres to the stone as part of itself. Good Roman cement will set below water, and when used for batting, only a few pounds should be made up at one time. It must be kept moving on a board while being used; if any portion of it be allowed to rest it will set, and become useless. Portland cement is longer in setting, but is tougher when set than Roman. It will bear a portion of sand, but it must be sharp, and free from any earthy matter, otherwise it will not set.

The intermediate standards will require to be set in stones, 16 in.

square by 9 in. deep, or stones of equal weight and base. The holes to receive the standards should, if in whinstone, be 2½ in. deep, and if in soft freestone, 4 in. The diameter must be regulated by the breadth of the standard.

The stones should be sunk 3 in. below the surface of the ground, and made firm by beating the earth well about them, care being taken to have the holes in a line with the straining pillars. Should any abrupt hollows be in the line of fence, it will be necessary to raise the standards perhaps above the surface of the ground to obtain an eye-sweet line on the top of the fence. The spare earth along the side of the fence can be used to bank up where required.

All the straining pillars in the line of fence being set, and the end pillars stayed, the intermediate standards required between any two of the straining pillars can be threaded on to the top wire before passing it through them, care being taken that if a tie or joint will occur on the wire that the required number is threaded on each side of the tie.

If the line of fence is straight, and nearly level, or of an equal rise or fall, the top wire may be tied at one end, and partly strained.

It is not necessary that all the straining pillars should have stays permanently attached to them, but only those at the extreme ends. If the top wire be strained the whole length of the fence, and tied at each straining pillar in the line, it will serve as a stay till the others are tied. Still it is necessary that the straining pillars should be stayed while the top wire is being strained.

Two stays made to nail to a piece of wood, 2 ft. long, 1 ft. broad, and 3 in. thick, answers the purpose nicely. The wood serves the same purpose as the stone at the fixed stays, and is fitted to the standard with the stay in the same way. These stays are placed at the second and third straining pillars. When these two lengths are strained, the stay is removed from the second pillar and placed at the fourth, and so on to the end. When the top wire is strained and tied, the intermediate standards should be slipped along the wire and placed in the stones. They should then be set upright, and keyed to the top wire with suitable sized sprigs, to keep them in their place when passing the other wires through them. Joining the wires in a neat workmanlike manner adds greatly to the beauty of the fence. Much depends on the tools used for this work. A pair of round-mouthed pliers is commonly used, with another tool called "clams." It requires two men to make a joint with these. A better tool than these, and one with which one man can do as much work, and to better purpose, is of the annexed form (fig. I.) To make a joint, the wire is placed between the prongs of the knotting standard.

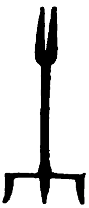

Fig. I.

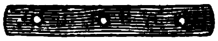

Fig. II.

The workman places one foot on the feet of it to hold it steady, and while holding the wire firm with the left hand, with the right he turns the part allowed for knotting round one of the prongs till it crosses the part held by the left hand, when he then turns it twice round. The knotting plate (Fig. II.), which should be 8 in. × 1½in. × ¼ in., is then applied by passing the end of the wire through one of the holes, and by turning the plate the knot is made firm. The other wire to be joined is done in the same manner, only it is linked in the other before turning the knot. The waste part should be cut off with a file, and placed in a bag for the purpose; it is dangerous for stock in various ways, and, besides, it is useful for making staples and rivets.

If there are curves or angles in the line of fence, side stays will be required wherever they occur. If the fence is only for pasture on one side, as in the case of plantations, all the stays can be placed on one side, and be out of the way of stock. Where curves occur it is not necessary that the intermediate standards should be placed all on the curved line. If they are so placed each standard will require a side stay, but if every third or fourth standard be placed on the curve and stayed, those between can be set in a straight line and will not require stays. All stays should be of round iron, as it is less dangerous for stock.

All the top wires being in their place, they should be partly tightened and keyed. At this stage it will not be necessary to tighten the wire more than to form a line for the intermediate standards and to keep them at an equal height. When the standards are placed in the stones sunk in the holes in the ground to receive them and batted, then the keys can be removed and the wire tightened fully.

The next thing to be done is to thread the other wires through all the standards from the first to the second straining pillar, and then strain them, driving in a key above each wire as it is strained, and when all are strained in that section if any are not tight enough the screw can be applied and the necessary tension attained. It is possible to overstrain the wire, and care should be taken that it is not done. When all the wires are of an equal tightness they should be tied and the keys driven out, and the other sections proceeded with in the same manner till the fence is completed.

Wooden intermediate posts are often used in wire fencing with iron straining pillars. Wood of the best quality should be used for that purpose; it should likewise be well seasoned and dry. It adds to the durability of the posts if they are charred and dipped in boiling coal tar. The usual way of charring is to expose the posts to a flame till the outside is burnt to a cinder as far up as is considered necessary, which (to be of any use) should not be less than six inches above the surface of the ground when erected. It is doubtful whether that plan of charring is of much benefit to the wood or not. One objection to it is that it is difficult to char the wood an equal depth, in fact after the greatest care has been exercised parts will be found not charred at all, but merely smoke-blackened. Any attempt to char such parts must have the effect of overdoing other parts of the wood and weakening it. I have seen fence posts charred in a large heap of chips and sawdust that were being charred for mixing with bones. After the interior of the heap was one mass of fire, a covering of sawdust was put on to prevent it from flaming, and thereby being reduced to ashes, and whenever the fire broke through the sawdust covering, more sawdust was put on. A few posts (larch) were thrust into the mass as an experiment, to see if they could be charred better there than by a flame in the open air. The posts were turned round in the heap to give each side the same advantage of charring, and were withdrawn now and again to note the effect of the fire upon them. They were withdrawn altogether when the outside was but slightly burned and allowed to cool. When the charred part was cut into it was harder than the part not charred, and of a darker colour. All the posts in store were subjected to the same process, and dipped in boiling coal tar. These were used in a wire fence alternately with posts out of the same cargo that had been dipped in boiling coal tar only. At the end of fifteen years the charred posts were mostly all sound, while those only dipped in the tar were nearly all decayed at the surface of the ground. The wires and posts were all tarred as soon as erected, and several years after had a coat of black varnish.

My opinion is that the charred posts retain the tar better than the others, as the char and tar form a body which the heat in summer cannot remove, while in the uncharred it removes the tar. A large boiler, such as is used for boiling food for horses or cattle, answers the purpose well for boiling the tar. The boiler should be placed on stones raised so high from the ground as to admit of a fire being made under it. The flue formed by the stones should extend 2 ft. beyond the boiler on each side, and must be covered with flat stones or metal plates, and then with earth sufficient to prevent the tar from getting access to the fire, should it swell and run over the boiler.

As much tar will be required in the boiler as will cover the charred part of the posts when they are placed upright in it. As soon as the tar boils, as many posts as the boiler will contain can be placed upright in it. Should the tar froth and rise in the boiler, the only remedy is to draw the fire from under it. The posts should remain in the tar at least thirty minutes. Both kiln and boiler should be placed apart from anything likely to be injured by fire.

The driving of the posts is made easier by using a tool represented by the annexed figure. It should be 3½ ft. long, 1¼ in. square, and steeled at the point. A handle of wood 15 in. long is fixed in the eye and the tool is complete.

A hole can be made with it in the shape of the post, and when that is done less battering is required, and less damage is done to the top of the posts. The posts should be driven an equal height from the surface of the ground, with an eye-sweet line on the top, before the wire is put on.

A piece of wire with the distances marked on it with a file at which the wires are to be placed from each other, is the most convenient plan for marking the place of the wires on the posts.

The staples for fixing the wires to the posts are generally made of No. 8 wire, with the points cut with a machine. When the points are on the outside of the staple it is right, but when it is on the inside it is wrong. The shoulder on the outside sloping to the inside causes the two joints when being driven to meet, and in hard unyielding wood they will drive no further, but will twist and break in the middle.

The top wire of the fence should be placed 3 in. from the top of the posts, and the wire for marking the place of the wires on the posts should be bent at 3 inches above the mark upon it for the top wire, so that the bent part may rest on the top of the post, while a man can mark with a pencil the place of the wires upon it.

The wires can then be stapled and strained. The staples should not be driven hard home on the wire, but space should be allowed for the wire to pass freely if it should be required for repairs.

(*To be continued.*)

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ASH TIMBER.—The ash tree is slowly disappearing from many places, and owners of hedgerow and copse would do well to plant ash, which is a most useful wood. Ash poles are plentiful, but ash timber gets scarcer year by year, for as the present trees are felled there are no young ones rising up to take their place. Consequently ash is becoming dearer, as the fishermen find; for many of the pleasure yachts which they let out in summer are planked with ash, which answers well for boats which are often high and dry on the beach, though it would not do if always in the water. These beach-boats have an oak frame, oak stem and stern-post, beech keel, and are planked with ash. When they require repairing, the owners find ash planking scarce and dear.—From *Round about a Great Estate.*

# Woods and their Management.

By GEO. E. BROWN.

At page 53 of vol. iii. of the *Journal of Forestry* I promised to give some account of my ideas regarding the thinning of young plantations, but have hitherto failed to do so. My reasons for this seeming neglect I need not mention here, suffice it to say that they are sufficient ones. I am sorry that Mr. Sym Scott thought it was in vain to wait for my experience, but trust that he and our friend "Sea Green" will now accept my remarks for what they are worth.

Perhaps by this time "Sea Green" may have had his 300 acres of plantation properly thinned, but whether or not, I trust, Mr. Editor, that you will not object to the re-opening of this discussion, seeing that it is chiefly by discussions of this kind, conducted in a friendly manner, that we can make our *Journal* a magazine of real use to all connected with the important science of arboriculture.

My subject then is thinning, although the heading of the discussion has been one that embraces a far wider field of employment, namely, "Woods and their Management." But as thinning is one of the most important branches of forestry, it may well be taken up by itself.

My own opinion of thinning is what I have already stated in the pages of this *Journal*. In a short article on "Seaside Plantations," in the third volume, and at page 168, I said :—"Much has been said about thinning by rule, but a practical man will at once give as his opinion that this is out of the question. It is only by experience that we can decide how to act upon entering a plantation for the purpose of thinning it." As regards leaving the trees after being thinned at a fixed distance one from another, this cannot be done, although perhaps a certain distance might be decided upon as the proper one. But in thinning we find that the trees in a plantation are never all alike, either in size, shape, spread of branches, or in a similar state of health. We often find that two trees are growing together, the one a fine, tall, straight, healthy tree, and the other a dwarf, unhealthy one. They may be too close to grow together much longer, so that the one or the other may have a chance, very probably the best one is being injured by the other. Any man who has had a little experience in the matter will at once take out the unhealthy tree. A small tree may be found growing between two that are in a flourishing condition. It is growing into the others, and all their branches are becoming intertwined. Thinning demands that it be taken out and room left for the other two. In like manner we have often to take two trees out to relieve one good one, one from each side of it, so that the best may find room to develop itself. In doing this we sometimes find that if we take out a tree to relieve another, a gap may be left, or at least a larger space of ground than may be desired. This should, if possible, be avoided, as large open spaces in a wood are unsightly. However, it sometimes happens that a larger space may be left than we would like. In my opinion it is better to take out a bad tree, even although a space may be left, than to leave it standing, as probably it may be injuring a good tree on one side of it. If it is a good healthy growing plantation in general, a space of this kind will soon be filled up, but by all means let gaps be avoided if they can be prevented. In thinning of course all dead and dying trees should be taken out, as many as possible of those that are succeeding best on the ground should be left as a permanent crop, and these should be left in such a condition that they have all room enough to grow without being crushed into by each other. Of course it is presumed that what is intended as the permanent crop of trees has been decided upon when the planting took place, and the plants put in accordingly; and presuming also that the soil and situation are suitable for them, we may infer that the trees which are intended to be left are generally healthy and in a growing state. If these trees are not healthy they should by no means be left, even although they are intended for the permanent crop. Rather leave those kinds that are healthy, and take out the least promising ones.

No age can be specified at which a plantation requires thinning for the first time. This all depends on how it has succeeded, and the local circumstances must also be considered. It is better to thin frequently and sparingly in most cases, than to thin severely and at distant periods. To enter into the question of *when* a plantation is in need of thinning would take up considerable space, but in a few words I may say that as soon as the branches of one tree begin to intertwine and crush into those of its neighbours, then thinning should be commenced.

If "Sea Green" wishes to make his plantation "a model of perfection in point of thinning and general management," to use his own words, let him carefully look over it and notice which trees are doing best on the ground. In thinning, leave these by all means, and clear out the worst ones, giving those that are left just enough room to grow without crushing into each other. Let him thin gradually at first, leaving them moderately thick on the ground, as they can easily be thinned afterwards when they require it.

I did not mean to "quickly retire after abruptly disposing of the subject," as Mr. Sym Scott would have it appear. I shall only be too glad to have this important subject discussed in these pages, with the Editor's permission, and shall feel glad to answer any critics who may have any fault to find with what I have said. My remarks have been, I trust, given in plain words, and not in roundabout phrases; I do not mean to say that there is anything new in them, on the contrary they are what every forester knows, or should know.

I cannot quite agree with Mr. Sym Scott, when he says in his last letter on the subject, page 724, vol. iii., "It is a great mistake to cut away trees before they become useful." Does he mean to say that he would not cut away a useless tree in order to relieve a good one? If we do not cut away some useless trees in a wood in order to give the others room, we shall soon have a wretched drawn-up mass of rubbish, and not a useful plantation. If Mr. Scott takes "a leaf out of the method followed in Germany," and leaves his trees "densely" thick for "at least fifteen years," I cannot see how he can have a thriving plantation. I have myself thinned young plantations of about that age in Ireland, which had never been thinned before, with the exception of a few poles taken out for estate purposes, and anyone who saw them before being thinned would have said that they were simply disgraceful. I thinned them very lightly at first, in order to prevent the winds having too much effect upon them, but notwithstanding they will never make such a good crop as they would have done had they been properly attended to when younger. I disbelieve in overthinning as much as Mr. Scott does, but the one evil is just as bad as the other. There should be a medium between the two in order to ensure success.

I hope that "Sea Green" will now give us his account as to what he has done with his plantation, or what he intends to do. I hope to see this subject further discussed in this *Journal*, so that opinions may be freely ventilated for the good of all concerned.

I trust that I have not trespassed on your space too far, and hope that my opinion on the subject may, as I have already said, be taken for what it is worth, and in a friendly spirit.

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THUJOPSIS DOLABRATA VARIEGATA.—One of the finest and most shapely specimens of the variegated form of this lovely conifer which I have ever seen I recently saw growing in the grounds at Danesbury Park, Welwyn. The specimen in question is over 14 ft. in height, densely and evenly furnished with branches, the variegation of the foliage being clear and well defined. It is in excellent health, and bids fair to become a really noble tree.—H. B. in *Garden*.

# The Beech (*Fagus Sylvatica*).

BY JOHN McLAREN, SCONE, PERTH.

As opinions, of whatever degree of merit, connected with arboriculture are kindly invited through the medium of this most valuable *Journal*, the writer has chosen the above subject, not as one that may convey any information that is not already known to the practical forester, but with the hope that it may prove useful and interesting to the younger members who follow the very important and most interesting branch of rural economy, the rearing and management of woods and forests.

Doubtless there are many valuable, sound, and highly practical lessons to be drawn from the pages of the *Journal of Forestry*, yet I think an occasional paper dealing with the more simple subjects might not be altogether out of place. If I might so state it, some of the subjects discussed treat of theories scarcely within the grasp of the juvenile mind in its primitive state of experience; not that we underrate the high importance of such subjects, on the contrary, they are fully appreciated, and we owe a deep debt of gratitude to the writers of such.

I have met with young men of seeming intelligence, who were afraid to ask the very simplest questions that could be imagined, solely because they were unwilling to display their ignorance of such ordinary matters. To some this utterance of mine may seem erroneous, nevertheless it is true.

I would therefore offer the following remarks upon one of our commonest hardwooded forest trees, and should it be of the smallest service to any, it will have met with the object for which it was written.

Apart from the utility of its timber, the beech might be a great favourite as an ornamental tree, rendered so by its silvery-tinted bark, its straight and handsome stem, and its thick massy foliage. When growing alone, and allowed to assume all its natural proportions, it is often a magnificent object, and in groves and masses it rivals many other trees in depth of shade and richness of effect.

The beech thrives best in calcareous soils, of which it appears to be a native, and it grows spontaneously, and attains its greatest dimensions on the thin oolites of Gloucester, and seems almost equally at home in the calcareous parts of Monmouth and the chalky soils of Surrey and Kent, in all which places it contributes very largely to the richness and beauty of the scenery. In the soils incumbent upon mountain limestone it often grows to a great size.

In referring to its useful qualities, it would be difficult to enumerate them correctly. The closeness of the grain of its wood, and the ease with which it is wrought, of itself recommends it to the turner and cabinet-maker, and therefore it is extensively used in the fabrication of furniture of the most useful sorts, and it is in constant demand for the construction of carpenters' tools and a great variety of implements used in mechanical arts. It is very liable to decay when exposed to alternation of wet and dry, as in the open air, but will last any length of time when kept dry, or on the contrary constantly under water; it is therefore sometimes used for the keels of ships, and for piles in laying the foundations of bridges. The beech produces more timber upon a given space of ground than any other hardwood tree, and is remarkable for the vigour of its growth, for in neglected plantations of mixed kinds it struggles through all opposition, and ultimately overtops its neighbours and destroys them. It is most valuable for a screen, for no tree better resists the force of heavy gales, or is less affected by them. Even when exposed singly to the fury of the western gales it seldom gives way to them, while other trees exhibit a one-sided appearance.

As this tree thrives well upon chalk, it might be rendered highly beneficial in forming screens over that extensive stratum in the south of England which is in many places exposed to the unbroken fury of the winds, presenting one of the most striking instances of the neglect of the agencies offered by nature for increasing the productiveness of the soil and the resources of the country.

Considering the well-known effect of exposure in lowering the temperature of the soil, and that of shelter upon the thriving of plants and animals, the neglect of the above improvement can only be accounted for upon the same principle as the neglect of draining wet soils, an evil of still greater magnitude. Even admitting that the ultimate crop of timber would be of little value, the firewood and charcoal produced by the thinnings would more than pay all expenses, while the rental value of the land so protected would be worth fourfold that of the whole of the previously unprotected space.

It should not be forgotten that the ashes of the beech contain a large proportion of phosphate of lime, which the roots extract from the subsoil, and which renders them exceedingly valuable as a manure. This may suggest the idea that a plantation of beech would afford a good preparation for the cultivation of a corn crop.

# Squirrels and Capercailzies.

By ROBERT COUPAR, Assistant Forester, Kinnaird Castle.

ALTHOUGH it is pleasant to see the nimble little squirrels sporting about among the trees, yet at certain seasons of the year they are decidedly mischievous, and cause much injury to the young woods and plantations. As is well known, their sustenance is gathered from the seeds of conifers, also from beech nuts, acorns, hazel nuts, &c., and after a severe winter, during which a scarcity of seeds has been experienced, these animals betake themselves to the young woods, and do great damage by nipping buds from the extremities of the branches, thus causing the trees to become bushy and straggling in the top; they also in the early spring and summer months denude many pine trees of their bark, commencing their attacks at 2 to 5 ft. from the top, sometimes peeling all round and sometimes in patches; in the former case, the heavy winds will cause the trees to break, but as regards the latter, the injury if not severe, will in time heal over, although usually producing what is subsequently known as a flaw in the timber. On examining around the foot of trees which have been attacked, the rejected exterior portion of the bark will be found, as the squirrels only eat the inside bark or liber, which is sweet and juicy.

In like manner squirrels attack deciduous trees, such as the beech and plane, thus frequently causing the tops to die. They also attack, late in the summer, the young shoots of the horse-chestnut, with the object of getting at the pith which they extract, leaving them hanging by the bark only at one side, whereby these trees assume the flat broken-topped appearance so often observed.

In woods where there is a good mixture of spruce fir, their depredations will be found to be of the most serious nature.

As regards [the] capercailzie, this large bird, although at one time very plentiful throughout Scotland, is not now so common, owing to the deadly aim of the sportsman, as well as to natural causes; however, there are still some good flocks to be met with, particularly in the woods of Perthshire and Forfarshire.

Although in the opinion of some, these birds do little damage to young woods, yet they are unquestionably destructive, in confirmation of which it will nearly always be found, on examination, that their stomachs and excreta contain buds of the fir tree and larch, needles or leaves of pine (*Pinus sylvestris*), and tender bark taken from the tops of young trees, also various kinds of seeds. The young pick up many insects during the summer months, but afterwards these birds depend largely, if not entirely, for their subsistence upon the young trees.

They are very wary on any one approaching, and make off on the slightest show of danger.

It may be mentioned that those trees which are situated on the sides of walks or drives seem to suffer the most, many of them being quite denuded of their leaves for about a foot from the top.

In conclusion, it may be stated that the squirrel and capercailzie are both destructive, their depredations combined tending to depreciate the value of many young woods and plantations, for which reason the former should be exterminated, and the latter kept in check.

## FOREST CLEARING IN NEW ZEALAND.

The New Zealand correspondent of the *Farmer's Magazine* states that a handy man on a farm can always find employment at good wages by going into the country, and he has an excellent opportunity afforded him by the Government of establishing himself in a permanent home of his own under the homestead law if he chooses to avail himself of it, as when he has forty acres of his own he can employ his spare time on it, until by-and-by he is able altogether to dispense with an employer. A really hard-working and industrious man will often work hard on his own place far into the night, after having done a regulation day's work with a well-to-do neighbour, chopping down, it may be, the giants of the forest by candle light. A little experience in this work teaches a man who has his wits about him to take many advantages in lessening his labour which did not occur to him at the outset, and he has also the chance of copying his more experienced fellows. In chopping trees, for instance, a line is chosen, and each tree cut half or three parts through, extending often to a great distance, the last tree of the line cut until it falls, managing it so that it shall fall full swing against the next one, which, by its tremendous weight, it carries with it, the third being caught in the same way, and so on to the last, however great the number, the whole falling like a house of cards in one enormous mass. When the dry season comes round a match is set to the whole and all is quickly burnt to ashes, with the exception of the trunks, which have to remain until the process of natural decay renders their removal easy. When the ashes are cool English grasses and clovers are sown, which, growing with astonishing rapidity, soon cover the entire surface knee-deep with luxuriant and succulent feed.

## PLANTING WET MOORLAND.

SIR,—Can any of your readers give me their advice how to plant wet moorland situated 1,000 feet above sea-level?

The soil is of a peaty nature, lying on a subsoil of stiff gray clay, 6 in. to 12 in. deep of the former, the latter varying from 5 ft. to 15 ft. in depth.

This land grows rough grass, rushes, and mosses, and is even in summer wet and spongy to walk on.

Shall I have any chance of success by open draining this winter, with ditches averaging eight yards apart, 28 in. wide at the top, 12 in. at the bottom, and 18 in. deep; and planting in the spring of 1882 with a mixture of spruce, larch, Scotch fir, sycamore, oak, ash, and alder?

Will the larch be likely to thrive on such a soil?

I would further ask if any of your readers have ever adopted the plan of planting larch (on a suitable spot) 6 ft. apart, instead of 3 ft. 6 in. or 4 ft.

This plan has the advantage of saving greatly in the first cost, and in countries where thinnings are of little value, saving the cost of cutting out the smaller trees, and at the same time giving each tree a greater area from which to draw its nourishment.

I have seen in Wales several thriving larch plantations planted in this way.

W. S. O.

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## PLANTING UNDRAINED CLAY LAND.

SIR,—I have not seen all the papers which have appeared in your columns on the subject of draining heavy clays before planting, so I do not know if a difficulty which occurs to my mind has been stated and met; it is this. It appears to me that in a few years the drains would be choked with roots. It is a notorious fact that drains in fields and hedgerows have constantly to be opened when there are ash, willow, poplar, and some other trees within a short distance, in consequence of their becoming filled with roots; and hollow surface drains would appear to me to be all that is necessary in the way of drainage to prepare heavy land for planting. Then as to the trees to be planted in such land, I would recommend larch and spruce to be included. Larch I find grow most luxuriantly for about fifteen years, when they are useful for many purposes; after that they begin to decline and become hollow at heart; spruce I find flourish for about thirty years in such land, when they begin to fall off in the same way.

I would strongly recommend Scotch and Silver fir for heavy land, the timber of the former when old being thought by my carpenter to equal the best Memel, the latter making splendid trees in exposed situations, and living to a great age. C.

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## ARE TREES INJURED OR BENEFITED BY THE DECOMPOSITION OF PRUNINGS WHICH MAY SURROUND THEM?

SIR,—When a phenomenon is observed usually to occur nearly about the same time, or always following in the wake of something else, the most rabid sceptic cannot but feel convinced that between the two exists some sort of connection. Probably the second does not always spring from the first; yet even this does not preclude the possibility of affinity. Neither need it be argued that having the first the presence of the second is a necessary alternative. It has been observed that swarms of injurious insects have made their appearance after a fall of timber, but it does not follow that wherever there is a fall of timber injurious insects must appear. It is established beyond contradiction that many *Coleopteræ* oviposit in decaying and fallen timber; in fact such material is their proper breeding ground, and when it is allowed to accumulate among trees, naturally the breeding of the insects is encouraged. That these insects are injurious to young trees planted on or near ground infested with them is also admitted, but it is asserted —on what ground is not assigned—that if trees above five years old are planted they will be beyond the reach of being "much damaged" by the insect. In a former letter it was stated that trees older than five years were "attacked," but nothing implied that "much harm" was done. Trees over eight years old have had their leading shoots "attacked," but the natural vigour of that age prevented "much damage being done," and the wound in the bark healed up the same season they were made. The trees referred to here were from 8 to 10 ft. in height.

The determination of a connection when phenomena do not occur at stated periods or together, but only more or less frequent, is a more difficult task. This year a whole crop of mangolds was sadly destroyed by *Anthomgia betæ*, and on making inquiries in the district no other field was known to be affected. It must be remembered that insect migration is either voluntary or involuntary: voluntary when the insect is of a *pedate* nature with *larvæ* that moves from place to place by means of articulate legs; involuntary when the *imago* is wafted before the wind. There is no limit to the distance of involuntary migration. When a cloud of flies oviposits in a district their larvæ will predominate for a season or two, but an All-wise Creator has so ordained that even in the insect world a balance of power is maintained. He has created and perfected all His systems, and preserves them from permanent injury or annihilation by the too great redundancy of any particular species. The Ichneumonidan family with their allies on parasitic larvæ appear immediately with the caterpillars and attack their victims with ruthless ferocity. The entire class of *Zoomyza* seems created to preserve an equilibrium amongst insects, while climatic influence, general treatment of forests, insectivorous birds, and the whole of parasitic insectivorous larvæ exercise their own effects in checking and finally subduing the inroads of destructive caterpillars. D. Sym Scott.

*Ballinacourte, Tipperary.*

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Sir,—I have been reading the papers which have appeared in the *Journal* on the above subject by Mr. D. McCorquodale, thinking, like others, to receive some reliable information upon the interesting matters which he is trying to explain; but in his last paper he is making it, in my opinion, more dark and uncertain by confounding one insect with another, and leading us to believe that it was one insect in its various stages that was doing the mischief, when in reality he is describing the work of three or four quite distinct species, which each in its own mode attacks trees at different stages of their growth. For instance, there are two large pine-eating weevils, *Hylobius abietis* and *Pissodes notatus*, which are most destructive upon young, newly-planted fir trees, especially in the neighbourhood of old fir plantations, or where these have been growing, as these insects breed amongst the decaying bark and roots. I have also seen them eating the bark on the branches of alder trees, but their attacks on these are not so deadly, as nature soon heals over the parts again.

Next there are the caterpillars which are the progeny of the Pine Sawfly, *Tenthredo pini*, which are hatched on and eat the leaves of all ages of fir trees, from the young stock in the nursery to trees a hundred years old. Mr. McCorquodale wonders what can be the local circumstances that would cause them to disappear in a short time? I have seen a plantation badly infested with them cleared by a flock of rooks in a few hours. Then there is the little pine beetle *(Hylurgus piniperda)*, a sample of which and its work I have sent to you to examine. [An excellent sample of this destructive pest, showing its deadly work in the shoots of the pine.—Ed.] This one I find here most numerously, and consequently doing more damage in plantations near to some clumps of old Scotch fir, by boring into and eating the heart or pith of the young shoots, and very often the leading ones, of trees from 4 to 10 ft. high. I am sorry to see that Mr. D. McCorquodale writes in such a sarcastic spirit in trying to explain his hobby, that decayed branches, &c., are the proper food of trees after their kind, because any man might know that, and we also know that they have their injurious effects as well, in being the breeding places of many mischievous insects. He has surely read the works of the various authors he refers to in a very superficial manner, if he is not aware that any one has found the pine weevil do damage to trees, say five years old, or over 3 ft. high. Will he please read more carefully page 81, Vol. vii., Part I., of the Scottish Arboricultural Society's *Transactions*, and page 131, Part II., of the same volume. He seems to be in blissful ignorance of the ravages of these insect pests, and writes on a subject of which he does not appear to have had practical experience

*Weston Park, Salop.* James Craig.

## THE LARCH DISEASE.

SIR,—It would appear from several communications in the *Journal of Forestry* for the month of December, 1880, that the result of the discussion on the cause of the larch disease at the last meeting of the Scottish Arboricultural Society, in the Royal Botanic Gardens at Edinburgh, was not quite so satisfactory as some of the members present could have wished. This was not to be wondered at, considering the nature of the subject. That a great number of most intelligent and experienced foresters were present, and that they honestly gave the result of their observations, there can be no doubt. It seems, however, that some of the phenomena in connection with this disease was attempted to be explained in a way not easily understood by some intelligent members, and it may have occurred to more than one member that it was almost questionable whether some of the explainers really understood their own explanations. Mr. D. Sym Scott seems to have fully appreciated the difficulty of understanding some of the explanations given. The theory of "the sap being thrown back on the bole and rupturing the sap vessels and causing blistering," may be correct, but there is just a possibility of it not being so, and explanations that cannot well be proved or disproved cannot be otherwise than unsatisfactory, and should be avoided as much as possible. That injury to the extreme points of the branches should have this effect when it is inflicted by insects, and no such result showing itself by damage to the same part of the tree from any other cause, seems a little strange, unless indeed the sap of the tree is in some way vitiated by the injection of some *virus* into the system of the tree by the insect. Having no physiological lore, and being an old-school forester, I would have supposed in my simplicity that a superabundance of sap thrown back on the tree would have made an outlet for itself by forcing buds into growth, as many other plants do when their leader is by any means injured or destroyed, instead of forcing or causing blisters. Blisters on the conifer tribe are generally charged with resin, and resin in large quantities in fir or pine trees generally indicates old age, or disease in a young tree. If the trees referred to were comparatively young, I suspect there may have been something wrong with the constitution of the plant or plants ere the extreme points of the branches were attacked by the insects.

I may be wrong, and very probably am wrong, in this view of the subject, but I cannot help feeling, after no inconsiderable opportunities of observation, that the cart is often put before the horse in discussing this mysterious subject.

At the Scottish Arboricultural Society's meeting there are always a great many evidently intelligent members who take no part in the discussion. Many of them have a dread of a breakdown if they tried to speak before so many intelligent men, and they prefer to say nothing, though could they be induced to take part in the discussions they undoubtedly could give most valuable information on many subjects connected with their profession.

If all cannot be got to take part in discussions, the opinion of the meeting might be taken on any subject by vote.

AN OLD FORESTER, N.B.

SIR,—In reply to Mr. Bayne as to the effects of severe frosts upon the previous season's growth of larch (under 20 years old), I may state that on this property frost has done no damage on larch, except on those recently planted, and especially where the trees were exposed to the morning sun.

*Hopetoun, Dec.,* 1880. JOHN MCLAREN.

SIR,—I send per post a specimen branch of larch fir, from a plantation about ten years old on the Cotswold Hills. Many of the trees are affected in the same manner as the piece enclosed, with a kind of white fungus about the size of clover seed. It appears first in the spring, covering not only the branches but the leaves, and by the next spring the tree is usually dead, or nearly so.

The plantation is about 600 or 700 ft. above the sea level. The soil is clay or clay loam on an oolite formation. Part of the larch are planted on a bank which has been dug for stone, and is now little more than a waste heap. There they are doing well, and show no signs of the disease.

I may remark that there are larch plantations thriving well in the immediate neighbourhood; and I am informed by the woodman that the plants now affected started well, and grew freely for some years.

Any information you could give me as to the cause and probable cure of this vexatious disease will be esteemed a favour.

*December* 9, 1880. H. J. G.

[The specimen sent to us by our correspondent shows a "diseased" larch branch overrun with a beautiful small white fungus, probably *Peziza calycina*, but the specimen is not in a condition to enable us to determine the species with certainty. These minute fungi are common on diseased or sickly larch trees. The nature of the soil, a "clay or clay loam," is not congenial to the healthy growth of larch, especially if combined with a cold, retentive subsoil. The larch delights in a good medium loam, resting on an open subsoil, through which water can freely percolate; such, in fact, as our correspondent describes the bank or "waste heap," where the larch is thriving and free from disease.

The heavy rainfall of the past few years, acting on the cold stiff clay soil, will naturally induce sickness or disease among the larch growing in it. Frost tells with most deadly effect upon trees on such a soil, particularly if lying flat or at the bottom of sloping ground. Open drains, from 5 to 7 yards apart, and not less than 2 ft. deep, may effect a cure by drying the ground; but if the diseased trees are at all numerous, the best plan would be to clear them entirely off the ground, drain it if necessary, and replant with trees which are known to thrive on soil of its nature.—ED.]

SIR,—Most of your readers who carefully perused your report of the discussion on the "Deterioration of Larch," &c., which took place recently under the auspices of the Scottish Arboricultural Society, will be grateful to Mr. Scott for having resuscitated the question in your last number. It is very desirable that maturing opinion should find expression through the *Journal* on this very important subject. It does seem strange that the Society cannot concentrate such opinion; from what cause I stop not to inquire. It is to be hoped that the present opportunity will not be lost. The Society did not too heartily support the inauguration of the *Journal*, and now, when the *Journal* has succeeded in commending itself and its mission to the heads and hearts of all concerned, the Society seeks to be associated with it. Your *Journal* is now said to be the "organ" of the Society. If true, there is nothing to be regretted, but one would deprecate the idea of the *Journal* becoming merely an echo of the opinions of that or any other Society, however distinguished. Long may a generous friendship exist between them and you. No doubt there is much to be gained, and also lost by association, and the Society seems bent on *gaining* thereby. I shall be reminded that I am a member probably. I know I am; and have a due respect for all my fellow-members, hundreds of whom, like myself, pay their subscriptions, read their *Transactions*, and patiently wait for the troubling of the arboricultural waters.

But what about larch? More particularly what about "blister" so called? In my humble opinion blister results from *premature metastasis excited by unseasonable cooling of the tree.* It first appears as a simple opening of the bark, filled with resin. Cooling of the tree, when sap is active, causes assimilation to cease; but the metastatic processes go on, resulting in a superabundant quantity of resin. This substance, acted on by successive coolings, bursts the bark, and exudes under sunheat. The resin with which these openings abound prevents recuperative processes which would otherwise heal the wound. Resin is not only a *degraded* product of the tree, the offspring of metastasis, and incapable of being re-assimilated, but by its presence in these openings, contact of the assimilable and assimilating matters is prevented. We regard, and rightly, these resin-issues as disease, but there is another aspect of the question. We may as properly regard them as the expressions of so many efforts of the tree to get rid of an abnormal condition. Were these issues not resulting, the vessels in the active parts of the tree would get destroyed to the extent that death would ensue. This is precisely what takes place when larch dies at the top, or when seedlings perish in our nurseries. The aggregate amount of pent-up resin, under certain conditions, does not find vent, but remains within to mortify and destroy the vital parts, causing certain death. The aphis is as innocent of being the cause of the disease as I am. I have only time to wish you and your readers a happy New Year.

*Rossdhu, Luss, N.B.*, JAMES GORDON.
*9th Nov.*, 1880.

## ARBORICULTURAL COMPETITIONS.

Sir,—I have to hand a copy of the Proceedings of the Twenty-seventh Annual General Meeting of the Scottish Arboricultural Society, containing a very correct account of what was done at that meeting.

In a note at the end of subjects selected for competition (p. 14), the Council urge upon members the desirability of increased competition.

We all very much regret that the Council should require to express such a desire as this, as too much information cannot be had or given about our favourite arboricultural pursuits.

One reason for this want of competition—(I am speaking for myself, and there are many of my arboricultural friends who think likewise)—is, that I do not know whether the Council would accept a report, essay, collection of geological specimens, or cones, under a *nom de plume*, as many foresters are deterred from competing unless the Council is willing to allow the judges to publish in the *Transactions* whatever they deem worthy of publication, and permit the writers (who wish to do so) to retain their *incognito*.

As an instance, take No. XIV. of the subjects offered for competition during 1880-81—"For an approved Report on the Plantations of which the competitor is a Forester." In my humble opinion, this is one of the most necessary of all the reports to give publicity to, as it is only by comparing notes that we can successfully combat with our common enemies, and they are many. I should like to see reports on bad and good plantations, more particularly the former, so that where one man may have made a mistake in the formation of a plantation, say twenty or thirty years ago, by giving a report such as asked by the Council, and pointing out where the errors lay, it would deter others from falling into the same mistake.

By helping one another in this way we should succeed practically ines tablishing a Foresters' School, having Great Britain and Ireland as fields for experiments; and would at the same time, by exposing blunders, show the necessity for a State Forest School.

Are there not many of your readers who could not fairly compete for Report No. XIV.? or if they did presume to do so, would they not run the risk of having something like this said to them, immediately after its appearance in the *Transactions*, by some unfeeling employer—unfeeling as regards the merits or demerits of arboriculture: "Well, I cannot see how you can attend to my interests and yet find time to write such a description as I am told you have given in the *Transactions* of the Scottish Arboricultural Society; and, besides, I do not want to let the world know all about the woods on my estate, so do not attempt anything of the sort again."

I must apologize for taking up so much of your valuable space, and trust that the Council will view the preceding remarks favourably, and allow competitors who wish to do so to retain their *nom de plume*.

*December* 11, 1880. E. H. N.

## ARBORICULTURAL SOCIETIES.

SIR,—Some time ago Mr. John Sadler, the late esteemed secretary of the Scottish Arboricultural Society, favoured us with a few articles with the above title. They appeared in the third volume of this *Journal* and promised to give much information regarding what has been done by the few societies of the kind that have been in existence. I was sorry to see that they were abruptly discontinued. Probably the increase in Mr. Sadler's duties, consequent upon his being appointed Curator of the Edinburgh Botanic Gardens, prevented him continuing these interesting articles.

I am sure many will agree with me in hoping that they will soon be continued. A history of the Scottish Arboricultural Society, and an outline of the work that it has done, would be a subject of great interest to all the readers of the *Journal of Forestry*. I hope that Mr. Sadler will soon find time to contribute such a history to these pages. There are many of us who do not possess its earlier *Transactions*, and who are, therefore, not so well aware of what has been done in the past as we could wish.

GEORGE E. BROWN.

## NOTABLE TREES AT HOPETOUN PARK.

SIR,—It may interest some of the readers of the *Journal of Forestry* to know that the magnificent oak on the Hopetoun estate (described in last month's *Journal*) belongs to the pedunculated species. There are also on this property some good specimens of *Quercus sessiliflora*. These two kinds of oak are, I consider, the only ones worth growing for the market in this country. *Quercus cerris*, or Turkey oak, is much given to rend, and is so difficult to work that wood merchants will scarcely buy it. The plants, besides, are more costly at first than the other kinds.

We have here several good specimens of the Evergreen Oak, some of which measure from 7 to 8 ft. in girth, and from 25 to 30 ft. in height, with beautiful spreading top, forming a lovely feature in a landscape, especially during the winter season.

The Service tree, with its white-backed leaves, is also a pretty species. Some of those here measure in girth from 6 to 7 ft., and from 28 to 30 ft. in height.

Near one of the old baronial residences on this estate are growing two yews, which are said to have been planted at the head of two worthies who fell during Covenanting days, some 400 years ago. One of these measures 13 ft. 4 in. in girth, and the other 10 ft. 6 in. The variegated-leaved plane or sycamore also looks well amongst other trees. Some of this variety measure from 7 to 8 ft. in girth, and 50 ft. in height.

We cut for our wood sale the other day a black Italian poplar measuring 9 ft. in girth, having 37 ft. of bole, and containing 110 cubic feet of timber.

*Hopetoun.* JOHN MCLAREN.

## FINE ORIENTAL PLANE AT WESTON PARK.

SIR,—I see in the *Journal of Forestry* for this month (p. 502), G. B. gives the measurement of the fine Oriental plane tree in the grounds here. These measurements must have been taken many years ago, and are incorrect, as you will see from the following measurements I have taken to-day.

Circumference of stem at 1 ft. from the ground 25 ft. 6 in.
„ „ at 3 ft. „ „ 19 ft.
„ „ at 5 ft. „ „ 18 ft. 6 in.

The stem is 11 ft. high, and then branches out into 12 large limbs, which measure from 4 ft. 6 in. to 7 ft. in circumference, forming a massive top, 100 ft. being the average diameter of spread of branches, and 80 ft. its full height. There are also many fine large oaks in the park here (remnants of the old forest): dimensions of some of these I shall send you by-and-by, when I can find time.

*Bradford Estate Offices,*
*Weston-under-Lizard, near Shifnal,*
*December* 4, 1880.

JAMES CRAIG.

## ANOTHER FINE TULIP TREE.

SIR,—In response to Mr. Watson's request (see p. 529), I beg to furnish the following particulars of a tulip tree growing on the lawn at Hampton Court, Herefordshire, the seat of John H. Arkwright, Esq.:—

| | |
|---|---|
| Circumference 1 ft. from ground | 16 ft. 8 in. |
| „ 5 ft. „ „ | 12 ft. 7 in. |
| Height to spread of branches | 13 ft. |
| Spread of branches ... ... | 66 ft. |
| Total height ... ... ... | 80 ft. |
| Cubic contents ... ... ... | 228 ft. |

The tree is in excellent condition, flowers annually, and is altogether a good specimen of the tulip tree.

THOS. HOGG.

*Beau Desert, Rugeley, December* 16, 1880.

## LARGE TREES AT YESTER, EAST LOTHIAN.

Sir,—The following measurements of a few of the large trees growing at Yester, the seat of the Marquis of Tweeddale, in East Lothian, may be of some interest to your readers. The trees grow at an altitude of between 400 and 500 ft. above sea level, in a moderately good soil, on the northern slopes of the Lammermoor Hills. The measurements were carefully taken by Mr. Sharer, lately gardener at Yester for nearly 40 years; the point of circumference in all the specimens being 3 ft. from the surface of the ground. The increase in girth of each tree in the 26 years, from 1854 to 1880, is given in the last column, the variations in growth being somewhat remarkable in trees growing under almost similar conditions.

| | Circum. in 1854 ft. | in. | Circum. in 1863. ft. | in. | Circum. in 1880. ft. | in. | Increase in 26 years. in. |
|---|---|---|---|---|---|---|---|
| Oak, in the grounds at the garden ................ | 13 | 10 | 14 | 0 | 14 | 10 | 12 |
| Oak, on the left side of walk from Yester House to garden .......................................... | 13 | 6 | 14 | 2 | 15 | 6 | 24 |
| Beech, in the grounds at the garden ............ | 11 | 2 | 11 | 9 | 12 | 6 | 16 |
| „ „ „ ............ | 12 | 6 | 12 | 9 | 13 | 1 | 7 |
| Larch, near Yester House............................ | 9 | 9 | 11 | 8 | 12 | 4 | 31 |
| „ „ ......................... | 9 | 6 | 10 | 3 | 11 | 4 | 22 |
| Spanish Chestnut „ ......................... | 16 | 0 | 16 | 8 | 18 | 2 | 26 |
| „ „ ......................... | 12 | 6 | 13 | 3 | 14 | 9 | 27 |
| Scots Fir, near the bridge............................ | 9 | 6 | 9 | 9 | 10 | 7 | 13 |
| Sycamore, near the dairy................. ...... ... | 14 | 5 | 14 | 7 | 16 | 0 | 19 |

D. D.

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**Obituary.**—It is with regret that we have to announce to our readers the death of the eminent agriculturist, Mr. Mechi, of Tiptree Hall, Essex, which sad event took place at noon on the 26th December, at his residence in Essex. Mr. Mechi's name has, for a generation at least, been a household word on every manor and farm in England. A successful merchant in London in early life, he, about forty years ago, resolved to attempt some improvements in farming, and to carry out his views he purchased the Tiptree Heath Farm, which he has since then rendered famous as the scene of enthusiastic skill and scientific experiments in almost every branch of agriculture. Latterly financial embarrassments somewhat impeded his efforts in the improvement of his favourite pursuits, and the effects of them on an otherwise robust mind may have tended to shorten the days of a long and useful life. He died at the ripe age of seventy-nine, leaving many sympathizing friends to mourn the loss of a man who has deeply set his mark for good on English agriculture.

## QUESTIONS.

75. Inarching.—Mr. Burrows, at page 507, writing of sweet chestnut, says: "In France varieties are produced by inarching." Will he or some other correspondent kindly say how this is done?—D. S. S.

76. Insects Injurious to Forest Trees.—Could you help me to the name of any book, or of any forester who might be able to give me information about any remedies for the attack of the Oak Leaf-roller Moth, *Tortrix viridana*, which does such great damage in some of our oak forests?—the Forest of Dean for instance?—E. A. O.

[Will some of our readers kindly oblige us with the desired information for E. A. O. on this very injurious insect?—Ed.]

## ANSWERS.

71.—Prevention of Suckers Springing from Roots.—In reply to your correspondent, R. R. B., who in your November issue (p. 476) requested a recipe for preventing suckers springing from newly-cut shoots, I would remark that a stump of a tree after being cut down extracts from the soil during the ensuing year that same amount of sap or nourishment which it did aforetimes, and if left unchecked that goes towards the formation of shoots, buds, and leaves. Thus the work of elaboration is carried on afresh, the growth increasing each year till good coppice wood is formed, which, if duly thinned, would probably ultimately attain the size of the parent tree.

Now, to prevent this I will mention for the benefit of your correspondent and others the following method which I have seen tried on a small scale:—All shoots should be cut low and covered with an inch or two of earth, or turf will serve the same purpose. Should this not be found feasible in all cases, the bark must be peeled down the sides of the stumps to an inch or more below the surface. In either event the sap will rise for a while, but no shoots, buds, or leaves will be elaborated, and decay forthwith sets in.

Quercus.

73. How to Renovate Ivy.—The ivy referred to by "A. E." was probably trimmed in too late in the season. In that case it will grow better this year and soon recover. The best time to cut in ivy is about the middle of May when it will soon break and grow from the old wood, and form a good covering to a wall before the end of the season. When cut hard back at any other period of the year, it takes longer to recover itself. It seldom, however, decays from being cut in.—M.

74. Specimen Trees.—In reply to "H. M." (page 531 of last month's *Journal*), I may mention that the largest *Pinus laricio* we have is 6 ft. 4 in. in girth at 4 ft. from the ground, and 65 ft. in height. The largest *Quercus ilex* measures 8 ft. in girth and 40 ft. in height.—John McLaren.

*Hopetoun, December*, 1880.

## ENGLAND.

**Planting** will still be the forester's chief work, and as the weather has so far favoured him this work should now be well advanced. At this season of the year his success will depend largely upon the plants being quickly removed and well protected, and upon their having been fairly exposed in the nurseries from which they were taken. Too great a change from warm situations to open sites will at this season be productive of many losses.

Planting upon very heavy soils cannot be properly done in excessively wet weather. The stiff clay either does not settle properly around the rootlets, or if trodden down heavily it encases them in a solid mass which may afterwards in a time of drought prove impenetrable to the small fibres. Better to suspend the work until spring than to run the risk of failure. But except for some of the inferior kinds of trees, it can never be expected that a fair return for the outlay will be obtained by planting upon such soils without first insuring proper drainage.

Trenching for all kinds of trees should, where performed, be executed to the full depth of the soil, unless this exceed 2 ft. or thereabouts. And a portion of the subsoil should be stirred or broken up, though this need not be brought to the surface. An indifferent soil well prepared will often produce results equal to, or even superior to those which are obtained from better soils which are not so prepared. For the purpose of raising screen plantations where a rapid growth is most desirable, no preparation is equal to trenching. Steam-cultivation when properly carried out may be made most effective, and at the same time it will prove the most economical method. In the case of a thin soil, where a proper depth for young trees cannot be obtained without breaking up and mixing a portion of the subsoil, the trenching, or ploughing and stirring should be carried out some months before planting to allow of complete æration and pulverization. If a fallow crop, such as potatoes or turnips, well dunged, can be taken, the land may be left in the best possible condition for trees. Heavy land should be left rough after trenching, and when ploughed the whole furrows should be left unharrowed for amelioration by frosts.

Hedgerow timber is sometimes pruned at this time on account of the difficulty of operating upon it when the crops are upon the land. One point to be especially attended to is foreshortening the lower branches where these are spreading so as to kill the hedges and spoil the crops.

The thinning of hardwoods should now be pushed on. These should be executed gradually and proportioned to the exposure, if the remaining trees are to retain their health and vigour. Always thin for the benefit of the timber left, and not for the market value of what is cut down.

Clear away all coppice produce as fast as possible. A little brushwood laid upon clearance roads at the commencement of the carting will do more good than a much larger quantity after deep ruts are formed. But all clearances should as far as possible be made in dry weather.

Collect cones wherever such are still obtainable. Wash young trees to protect them where rabbits abound. Attend well to pinnocks and watercourses, deepening all main drains and keeping such free from accumulations of leaves and other rubbish. Finish planting hawthorn hedges during this and the succeeding month. Trim in old overgrown hedges where the situation is not too much exposed.

Upon the subject of drainage for plantations I may here repeat what I wrote in Vol. I. of this *Journal*:—"Really healthy vegetation cannot exist where water stagnates, as plant food becomes too much diluted, and owing to the increased evaporation the temperature of the plant is always low; so that all chemical changes are retarded. Even where there is heat as well as moisture, if air cannot reach the roots the produce is leaves alone, and not fruit. Deep drainage supplies the roots with air, as air always follows descending water, whereas surface evaporation checks the descent of air. Where the sun's heat is exhausted in evaporating water it cannot warm the soil. The drainage of peaty and clay soils is especially desirable, as when well filled with moisture and afterwards dried by the sun these soils lose about twenty per cent. of their former bulk By this means the roots of trees embedded in them become so compressed that air is entirely excluded."

*Pluckley, Kent.* A. J. Burrows.

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## SCOTLAND.

Following up the work of last month, all timber that has been felled should now be prepared for sale. It need scarcely be mentioned that where the quantity to dispose of does not amount to more than £400 or £500, and when it is made up of various classes, the best way to sell it is by public auction. Allowing for extra expenses in connection with this method, they are generally amply repaid by the enhanced prices obtained when the timber is arranged in small lots to suit different buyers. Care should be taken in putting up the lots to have all the different kinds classed by themselves, such as handle-wood, planking, &c. Nothing helps to make wood sell so well as to have it laid near good roads; and this work is often better and cheaper done by the proprietor. When the timber is all of one class, and if standing, it is often best disposed of by private tender. All work of this kind, or any other odd jobs that cannot lie over till after spring should be pushed forward so as to leave all hands free for spring planting.

W. W. R.

## IRELAND.

The home nursery being now well cleared out of such stuff as will be planted *in situ* this season, the ground so emptied ought to be well cleaned and deeply trenched. If to be replanted, spread on the surface, after trenching, lots of rich compost made up from leaves, road scrapings, decayed weeds, wood ashes, cleaning of dykes, and old barnyard manure. Lime is often mixed with compost, but for trees, particularly larch, it would be well not to apply compost having lime. Seedlings ought to be planted in line during fine dry weather, and if done this month will make excellent growth next summer. It usually happens that a few weeks of genial weather follows the Christmas holidays, and if taken advantage of in the way indicated, will facilitate the forester's spring work. No opportunity should be omitted in having all nursery work forwarded.

This month, above all others, is most convenient for general ground work. Horses are more easily procured when other operations are not pressing, so that much ought to be done in making roads, levelling, or forming terraces, and all similar operations.

Building new fences, subdividing fields, and up-rooting trees in parks, &c., are some of the works the forester will have to grapple with during the month. Underground draining ought to be wound up as fast as possible, otherwise it will interfere with agricultural operations.

The planting of forest trees may be carried on in fine weather, but with seasons such as the past the work ought to be far advanced. On wet soil or ground imperfectly drained it is better to defer planting until later in spring.

Cutting all sorts of hard wood may now be gone on with. Of course it is to be understood that oak and other trees from which the bark is saved must not be cut at this season. The clearing of underwood; layering for game coverts; and, as the shooting is in most instances over for the present, game preserves should be trimmed and the refuse immediately removed therefrom.

*Ballinacourte, Tipperary.* D. SYM SCOTT.

## WALES.

MUCH will depend upon the state of the weather in determining the work to be done in the woodlands during the present month.

Continue planting, preparing, and enclosing ground as weather permits.

The cutting of underwood and general thinning of plantations should now be pushed forward with all available strength. Draw to a close the falling of hedgerow trees, and when the timber is disposed of, have it removed during frosty weather, or when the ground is dry and firm.

Bind and prepare faggots and firewood, and have the same removed and stacked as early as possible.

Look round all fences, tree guards, and wire netting; when ground game have access to young trees they are sure to damage them during hard weather.

Where young hedges are to be planted in the spring, the ground or *bed* should be well trenched, and prepared to receive the young plants.

Evergreen and ornamental trees should be attended to during heavy falls of snow, and the snow shaken off where weighing down the branches, or likely to damage or break them.

Continue the stoning, gravelling, and repairing of roads and drives.

Trench and turn up vacant ground in the nursery, and turn compost heaps.

LEWIS BAYNE.

*Kinmel Park.*

ERRATUM.—In the twentieth line from the top of page 509 of last month's *Journal* I see that my article on the Larch Disease reads, "Nor upon cold hilly land," whereas it should be, "Nor upon cold *tilly* land." By making this correction you will much oblige—JAMES RENTON, Overseer, *Cleghorn, Lanark, N.B.*

*The Fir Tribe.* Richard Smith & Co., Worcester.

We have received an interesting and useful little book on plants of the fir tribe suitable for the climate of the United Kingdom, cultivated by Richard Smith and Co., at The Nurseries, Worcester, giving their popular and scientific names and derivations, their habitats, and the sizes they attain, with descriptions of their forms, growths, foliage, uses in the arts, soils and situations adapted for their culture, &c.; also a copious index of their many synonyms.

*The Fern Paradise.* By FRANCIS GEORGE HEATH. Serial Issue. London: Sampson Low, Marston and Co.

The twelfth and concluding part of this delightful work contains a description of the Tunbridge filmy fern and the one-sided filmy fern, with a plate (number eight) representing a frond of each kind. We gather that "the filmy ferns form a sort of connecting link between the ferns and mosses. They are the tiniest of all the British ferns, forming little tufts sometimes only one inch in length; but sometimes growing to a length of six inches. Their semi-pellucid and filmy nature is sufficiently expressed in the common name given to them."

The Author in this farewell address, "L'Envoi," makes an earnest plea on behalf of fern culture, from which we give the following extract on Nature and Art:—

"There are abundant facilities for the exercise of the most luxurious and expensive taste in the selection of the accessories needed for transforming into a "Fern Paradise" either dwelling-house or garden. Even rigid conventionalism pays homage to Nature by calling artistic effort into requisition in order to produce petrified imitation of leaves and flowers. The high art of the painter and sculptor, and the ruder arts of house decorating, are employed in this work of imitation; but the result—often beautiful and striking as an artistic success—pales before the exquisite reality of Nature itself. Why then do we not sweep away from our dwelling-houses the rigid conventionalism which is content to represent Nature in stereotyped lines in places where she is only too ready to come herself, in all her chaste and simple yet inimitable loveliness?"

*The Horticultural Directory* for 1881. London: "Journal of Horticulture and Home Farmer" Offices, 171, Fleet Street, E.C.

This contains the names and addresses of all the foresters, gardeners, nurserymen, seedsmen, and florists throughout the United Kingdom, arranged in a perfectly methodic manner so as to be easy for reference. There are besides complete lists of the seats of the nobility and gentry in Great Britain and Ireland, also of the botanic gardens and public parks throughout the world. We have in addition the addresses of landscape gardeners, garden architects, and horticultural builders and engineers also of the botanical, horticultural, and floral societies in Great Britain and Ireland. Lastly, there are the addresses of the principal nurserymen, seedsmen, and florists on the Continent, in America, and the Colonies.

*Report on the Progress and Condition of the Royal Gardens at Kew during the year* 1879. London: Eyre and Spottiswoode.

In the annual report of Sir J. D. Hooker, C.B., there will be found much information concerning the famous resort at Kew, of which he is the able director.

We find that the number of visitors last year was 369,134, and large as these figures may seem, yet they exhibit a falling off as compared with the year previous. The bank holiday of August 4th brought the greatest number of visitors admitted in any one day during the year, viz., 51,949. On August 3rd a disastrous hailstorm wrecked the greater part of the glass houses and compelled their being closed for the rest of the year. Some idea of the magnitude of the destruction may be formed from the fact that the broken glass amounted to 18 tons.

In effecting repairs to the woodwork of the tropical fern house and other houses, pine wood has been largely replaced by teak, which it is hoped will eventually prove a great economy. The teak-wood tallies, giving the names of the collection plants in the arboretum, &c., which were placed in the ground in 1872, show no signs of decay.

With regard to the arboretum, Sir Joseph Hooker states that the efficient keep of this fine piece of ground, and its ever-increasing classified collection of hardy trees and shrubs, is a source of continual labour and much consideration, especially with regard to its future. The condition of Kensington Gardens is a standing warning as to the possible future condition of the trees at Kew. These grounds are in many respects similar; in both the soil is very bad, and requires copious supplies of loam; many of the trees are old and stricken with disease; and the increasing number of visitors renders it impossible to preserve them in the wild condition which was formerly their most attractive feature.

As the forested portion decreases, and what was wild wood becomes converted into a lawn with specimen trees and shrubberies, so does the expense of keep increase; and large spaces must be devoted to new plantations if the sylvan scenery, whether as forest or park, is to be kept up. This involves not only young trees (of which there is, happily, an abundant supply raised in the Gardens of the rare as well as the common kinds), but trenching the ground for planting, good soil to put in with the young plants, and continuous labour in keeping the ground open to the rain and clear of weeds.

During the first ten years of the directorship of Kew, nearly the whole of the ground was a game preserve, covered by timber, and the clearing of open spaces (whether for the purpose of replanting or for meeting the requirements of the arboretum) was prohibited. The result was the loss of many old trees, the absence of young ones to replace them, and the ruin of the collections, which, being planted in woods, were starved for want of light and of soil, as well as strangled by the roots and destroyed by drip from the surrounding and overhanging trees. For the last fifteen years this policy has been modified; and the interest shown by the public, and especially by horticulturists, in the arboretum, has led to its requirements being regarded as paramount.

*The Indian Forester.* Vol. VI., No. II. Edited by J. S. GAMBLE, M.A., F.L.S., Officiating Conservator of Forests, Bengal. Calcutta: Published by the Calcutta Central Press Co.

This magazine, which is the special organ of the Indian Forest Service, reaches us at such uncertain intervals and so long after date, that most of its contents are so old as to be of little interest to our readers. But of the 92 pages comprising the number before us, barely one-fourth is original matter, the other three-fourths being the product of the editorial labours in culling extracts and quotations from the public journals, Government reports, official papers and gazettes; and no less than six and a half pages are devoted to a crabbed and unworthy review of the *Journal of Forestry*. The editor of the *Indian Forester* shows scant courtesy to his British *confrère;* and if the style of criticism employed is a sample of the manners of the gentlemen composing the Indian Forest Service, on which the Editor so prides himself, we almost doubt whether we ought to encourage any rising young foresters to seek the honour of their society. However, the *Journal of Forestry* and its contributors can afford to give a lesson in good manners and gentlemanly conduct to those who, in their wrath at the exposure of a rotten system which they would fain uphold, forget the rules which guide the conduct of gentlemen, and in support of a bad cause resort to the ill-bred manners of the low attorney, and "abuse the opposing counsel"!

Of the original papers in this number the following are worthy of note and perusal. A proposal by Mr. H. Warth, of Dehra Dun, for the protection from fire of the forests on the declivities of the Sewalik Range, for the purpose of diminishing the floods by which great damage is now caused; an excellent paper by Mr. E. E. Fernandez, on "Frosts and Forests," the "Durability of Indian Sleepers, and the rules for marking them," by Mr. G. L. Molesworth; and an interesting account of a visit to Mount Faron, near Toulon, France, by Mr. E. M. A. Moir, giving some details of the well-known operations which have been so successfully carried out there in the *reboisement* of the mountain. A native, Mr. S. C. Chuckerbutty, has a short article, in which he gives a few simple details of the "Precautions to be taken in felling trees singly in dense forests." "Hard Cash" makes some pertinent remarks on the "Technical Terms of Forest

Economy," and the necessity which exists for a handbook which would give a list of all the English terms used in forestry, and the equivalent technical terms used in France and Germany. A book of this description is much wanted. Some interesting particulars concerning "Firewood and its cost of extraction from the Jaunsar Forests," and the "Relation between the weight and contents of Stacked Fuel," are from the able pen of Mr. A. Smythies. A short but interesting account of the career of Mr. Alfred Pengelly, who was unfortunately killed by a black bear throwing him down a precipice at Chamba, in the Punjab, on the 29th of July, 1880, fitly opens the number, and puts on record a few of the merits of one of the pioneers of the forest service, a most worthy and upright man, whose untimely end all who knew him will deeply deplore. Extracts and official notices, too stale for repetition, fill the remainder of an average number.

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*The Florist and Pomologist.* The number for December of this excellent serial contains a notice, with a coloured plate of auricula Horner's Heroine, a charming novelty, exhibited by the Rev. F. D. Horner at the National Auricula Society's show at South Kensington this year, when it won a first-class certificate, and the first prize as a seedling (self). The ground-colour of the flower is a remarkably rich and velvety deep umber brown.

There is also a notice, with coloured plate, of a handsome, new, prolific raspberry, raised by Mr. John Baumforth, of Pontefract, and hence named Baumforth's seedling.

Other articles are devoted to such subjects as grape, plum, and raspberry. culture, and valuable hints are given also in connection with floriculture.

*Timber Trades Journal.* Printed and published by J. & W. Rider, 14, Bartholomew Close, London, E.C. Weekly, Price Fourpence.

Amongst our contemporaries this is one which is perused with the greatest interest by foresters, on account of the material information they glean from its pages in regard to the rise and fall of the value of the produce of the woods under their charge, and their laudable anxiety to obtain the best market for the sale of such produce. The copious details given weekly in this journal, of every timber market, and sales of forest produce in almost every part of the kingdom, renders it an invaluable guide to the forester who is anxious to dispose of the fruits of his labour to the best advantage. By a careful study of its market reports, and prompt action on the part of those who have produce to sell, whenever the markets are favourable, the highest prices will be secured, alike creditable to the persevering forester and remunerative to the enterprising proprietor, who has invested in tree plantations, or is the owner of large tracts of woodlands.

Although the most valuable from a commercial point of view, the market reports are by no means the only features of special interest to the arboriculturist in this ably conducted journal. Clever and well-written articles are written every week on a great variety of topics of much interest and importance to all who are in any manner concerned with, or interested in, forests, forest trees, and their produce. Many of the articles, especially on trade subjects, are profusely illustrated with plans and diagrams, which clearly show to the reader the recent improvements and best forms of machinery, implements, and other articles employed in the felling, transport, and conversion of timber.

As a medium between the sellers and buyers of timber, this journal is now indispensable to the owners of forests and plantations, foresters, timber merchants, builders, clerks of works, cabinet makers, joiners, mill and wheelwrights, shipping agents, railway contractors, and all others who manufacture, buy or sell home or foreign wood of any description. With its valuable aid business connected with the timber trade can be conducted on the best and most remunerative principles.

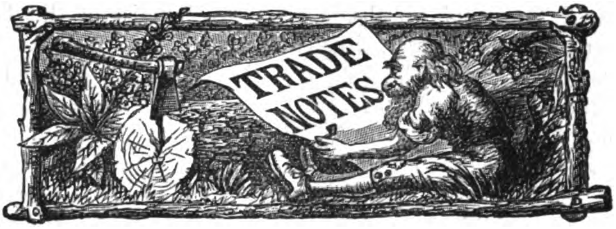
## OUR FOREIGN EXCHANGES.

In last notices of Foreign Exchanges, p. 533, lines 6 and 7, for "and the Manteau pines," read *on the maritime pines;* line 10 for "M. Seuvrail" read *M. Seurrat;* line 15, for "M. Putard," read *Mr. Puton*, and the same in line 31. The December issues of the periodicals usually sent from the continent have arrived, and with these there have been received from Spain the first two numbers of a new periodical entitled *Revista Popular de Conocimientos Utiles*, and two numbers of *L'Echo Forestier* of Paris.

In *L'Echo Forestier* is a second communication by M. J. Seurrat de la Beulave on the *Maladie Ronde* of Maritime Pines, and Scots Firs, issued by *La Société des Agriculteurs de France.* In the *Wiener Illustrirte Garten-Zeitung* is a paper on the disease of coffee plants, by Professor E. Hallier, Genoa, a translation of which, or rather a paper founded thereon, containing more detailed observations by others, is forthcoming whenever space may be found for it. There appears also a notice of a treatise on the *Phylloxera vastatrix* now ravaging the grape vine—issued by the Prussian Ministry of Rural Economy, and a notice of a projected International Conference on the subject.

Besides the exchange publications, there has been sent to me from Russia the *Beiblatt der St. Petersburger Zeitung* of the 9th December (N.S.), containing a paper on the importance of extending greatly the area of State Forests, and another on the Means of Extirpating the *Phylloxera* which is threatening the destruction of the vine, in which it is stated that now it is established beyond question that the insect has found a domicile in Russia. It had devastated a vineyard about ten acres in extent, in the neighbourhood of Galatz; and the whole of the vineyards there had been doomed to destruction in the hope that with the destruction of the vines might be effected the destruction of the insect and its brood. It alleges that all the means hitherto employed to arrest the evil had proved to be of doubtful efficacy, but that a new prescription had appeared in the last issue of the *Wiener Landswirthschaftlichte Zeitung.* Dr. Lakish, a vineyard proprietor in Siebenburg, had spoken of it as of easy application, and as incapable of doing any injury to the vines or their produce. It consists simply of giving to the whole vine—and so far as practical to the roots—a coat of whitewash, and pruning the vine-stocks in autumn in place of doing this in spring. I do not feel called upon to discuss here the probabilities of success attending this measure. In the paper cited Dr. Lakish writes—"Instead of prosecuting the means by which the grape-louse may be sought out and destroyed in its almost inaccessible places of concealment, I would attack it during the period of its summer excursion, and that which follows therein while the egg is awaiting the hatching warmth of the sunshine. I therefore recommend to the vine-grower to treat vines which have been attacked and those which are only exposed to attack in the following way:—In the course of the summer, the time of the louse leaving its subterranean dwelling-place and appearing above the surface, draw aside the earth from around the root of the vine-stock, and with a whiting brush or other appliance, give the root a layer of whitewash—lime or whiting or chalk held in suspension in water to the consistence of cream. When this is dry, or at latest, next day, replace the earth about the root. As soon as the grapes are gathered and the vines have lost their leaves, let the vines be pruned, and thereafter along with the buds upon them let them get a coat of whitewash. It may be understood from this that the whitewash must be applied with careful inspection and completeness, and that it is by all means necessary that if any be washed off by rainfall following shortly or within some time thereafter, it must be renewed. Let this be done, and I predict an entire annihilation of the insect, and this possibly in the course of the first year. Through the whitewash always killing a large portion of the lice which adhere to the bark of the vine-stock and there lay their eggs, alone, and further as the eggs themselves will also be destroyed,—there is ground to expect that by this treatment of affected vines, and of vines threatened with attack, in some years hence the disease itself will entirely disappear; and it may become known how successfully to bring about ultimately the utter destruction of the pest."

There has also been sent to me a reprint from the Vienna *Centralblatt für das gesammte Forstwesen* of a paper by Forstrath, Dr. Nordlinger, of the Royal School of Forestry and Agriculture at Hohenheim in Wurtemburg, *On lunar influence on trees.* It is a popular opinion in many parts that the quality of wood is affected by its being felled during the period of a waxing or of a waning moon. By a series of numerous observations on cuttings from the beech and the fir, taken at 6.30 a.m., daily from Feb. 21 to March 21, 1879, embracing fourteen days before and fourteen days after the full moon, and like observations on cuttings from the beech and the Weymouth pine, taken daily at 4 p.m, from the 21st July to 15th August, 1879, embracing thirteen days before and thirteen days following the full moon, for making which observations Dr. Nordlinger was pre-eminently fitted and favourably situated, he has proved that no malign influence whatever is exercised upon trees by the moon. JOHN C. BROWN.



**Forest** Tree Catalogues and other lists of hardy trees and shrubs are the principal feature among the trade publications which reached us in November and December. Why nurserymen in Britain are so prejudiced against an earlier issue of their lists which are so necessary to the planter, is past comprehension, seeing that the Continental lists begin to pour in on us so early as July. There is no good reason that we have heard of, why our nurserymen could not as easily issue their lists in August as in November; and being thus early in the hands of likely purchasers, they would incite and promote a desire to plant which they could at once carry into effect in the leisure days of autumn. Among the lists which have come to hand are the following:—

**Little & Ballantyne**, Carlisle, "Forest Trees, Ornamental Trees, and Shrubs, Selected Trees for Gentlemen's Parks, Lawns, Avenues, Public Parks," &c., an excellent price list of the extensive stock of forest and ornamental trees grown by this well-known firm, and which will be found especially useful to the planter in selecting the kinds and quantities of trees he desires to plant. **Richard Smith & Co.**, Worcester, "Tree and Shrub List," and "List of Prices of Conifers," two useful and comprehensive lists which should be in the hands of every planter of ornamental and coniferous trees. **William Barron & Son**, Elvaston Nurseries, Barrowash, near Derby, "Descriptive Catalogue of Ornamental Plants," a capital selection of the best and choicest hardy ornamental trees and shrubs, the lists being freely interspersed with interesting and instructive notes upon the leading varieties, which will be found specially serviceable to the uninitiated in tree lore. **F. & A. Dickson & Sons**, The "Upton" Nurseries, Chester, "Forest and Ornamental Trees," &c., contains well got-up lists of the great variety of forest and ornamental trees, for which these extensive nurseries have been so long celebrated. **Ben. Reid & Co.**, Aberdeen, "Catalogue of Forest Trees, Conifers, Shrubs," &c., a valuable list of a well-selected and very extensive stock from which the planter may choose any variety and size of forest tree most suitable to his wants, as well as a great variety of the choicest hardy ornamental trees and shrubs. A special feature of this useful catalogue is a table of the "Rates of Conveyance of Trees and Shrubs from Aberdeen" to most of the principal towns in Great Britain, which will be particularly appreciated by those at some distance from Aberdeen, who are thus enabled to form their estimates with greater accuracy. **James**

SMITH, Darley Dale Nurseries, near Matlock, Derbyshire, "Wholesale Catalogues of Trees and Shrubs," &c., gives a full list of the fine hardy stock grown in these nurseries, situated in one of the most elevated cultivated parts of England. The lists give the botanical and popular names, height of the plants offered, their price per dozen, hundred and thousand, with numerous descriptive remarks of interest to the planter. JAMES DICKSON & SONS, "Newton" Nurseries, Chester, "Forest and other Trees," &c., a very comprehensive list of the large and superior nursery stock for which this old-established firm has been so long eminent, and which will repay perusal by foresters and others interested. The LAWSON SEED and NURSERY COMPANY, Edinburgh and London, "Forest and Ornamental Trees and Shrubs," &c., got up with the usual fulness and ability of this celebrated firm, and includes everything in ordinary request by the forester and tree planter. FISHER, SON, & SIBRAY, Handsworth, Sheffield, "Catalogue of Fruit, Forest, and Ornamental Trees, Evergreen, and Deciduous, Shrubs," in which is given excellent lists of the large and varied tree and shrub stock grown. The collection of hollies is one of the finest in the country, and is particularly worthy of the notice of planters of these most useful and ornamental hardy evergreens. ORMSTON & RENWICK, Melrose, Roxburghshire, "General Catalogue of Forest and Ornamental Trees, Hardy Coniferæ, Evergreen, and Flowering Shrubs," &c., is a handy list of a fine stock of choice trees and shrubs grown in an exposed situation, and in a soil adapting them for safe removal to any locality. THOMAS METHVEN and SONS, Edinburgh, "List of Rhododendrons," &c., a very full list of these beautiful hardy plants, for which this firm has long held a wide reputation for the variety and excellency of its stock.

## DEATH OF AN INDIAN FOREST OFFICER.

MOST of our readers, says the *Indian Forester* for *October*, 1880, will have heard ere this that Alfred Pengelly has been killed by a black bear throwing him down a precipice in Chamba. By his death Government has lost an excellent servant, and all those who had the privilege of being personally acquainted with him, deplore the untimely death of one whose character was without a blemish.

It was early in the morning of the 29th July, 1880, when his servants woke him and told him that a black bear was close by eating the villagers' fruit. He dressed quickly, went out, fired at the bear and missed it. The latter went off, and Alfred Pengelly followed it up with a favourite and most excellent little fox terrier, "Vixen." He traced the bear to a cave, situated above a precipice, and approachable only by a narrow path. "Vixen" could not be stopped, and went in at the bear. Alfred Pengelly, hearing his dog being punished by the beast, went to his assistance along the narrow path. Suddenly the bear rushed out, and before he could fire, Alfred Pengelly was seen falling over the precipice. Whether the bear actually pushed him down, or whether Pengelly, in trying to avoid the bear, stepped over the edge of the precipice, has not been ascertained. He fell clear down for upwards of 300 ft., and death was instantaneous.

Having stood at the head of the first year's trained English Forest Officers, Alfred Pengelly may be called the leader of that section of the forest service, which position he filled most worthily, not only on account of his attainments in general and forest knowledge, but also, and perhaps more so, because of his thoroughly upright and simple-minded character. He was a true friend; and although his life cannot boast of any specially brilliant episodes, yet he was a man one does not meet with every day.

Alfred Pengelly married about two years ago. He lost his only child nearly a month before his death, and he leaves a young widow mourning his loss.

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## PRECAUTIONS TO BE TAKEN IN FELLING TREES SINGLY IN DENSE FORESTS.

When a tree is to be felled in a well-stocked forest, it is most important to preserve the neighbouring trees and young tender seedlings from injury.

I have invariably noticed that by the careless felling of trees, especially by private purchasers, many young seedlings and trees of immature growth are broken down by the fall of a big tree, and die in consequence.

It is necessary, therefore, when a tree is to be felled, first for us to determine in which direction there are fewest seedlings and trees, for in that direction the tree ought to be felled; and, accordingly, I would suggest that the departmental mark be placed on the tree on that side.

It would be necessary to impress upon the wood-cutter that, whichever side of the tree bears the departmental mark, in that direction the tree must be felled.

If the tree has many large branches, these as well as all creepers, should be cut down before felling the tree; and instructions should be given at what height the tree is to be cut. If it is settled that the tree is to be cut at 2 ft. from the ground, the wood-cutter must be carefully instructed first to cut the tree with the axe very deep on that side of the tree to which it is intended to fell, and about 9 in. lower than the cut to be made on the opposite side of the tree. When the tree has been cut on both sides and about three parts through, then the remaining portion should be cut by the saw on the opposite side or back of the tree, which will then come down straight in the direction intended.

The above method in felling trees has been tried, and the result found almost certain. And by insisting on this method being carefully used, the wood-cutter may rescue the lives of many valuable seedlings.—S. C. Chuckerbutty, in *Indian Forester*.

# HOW TO PLANT A SHRUB GROUP.

LET me depict to you, as nearly as I can, what I find to be the usual conception of a well-planted shrub group: I mean a shrub group properly planted according to the standard of most gardeners and lawn planters. It consists simply of an oval or circle of spaded earth, filled to repletion with shrubs planted 2 ft. or 3 ft. apart. Cultivation and mass planting are evidently here kept in view—laudable objects, certainly, in their way—but how about the arrangement of colour and form in foliage and flower? What evidence is shown in such cases of knowledge and adaptation to the various seasons for blooming peculiar to species and varieties? I fear both knowledge and taste here fail lawn planters and gardeners in very many cases. Must we draw the inference that lawn planting skill is at a low ebb among those who should know it best? If not, how otherwise can we account for the fact that knowledge and taste are so conspicuous by their absence in the construction of most shrub groups? One might fancy that the bedding-out system applied to ribbon gardening had furnished models for planting many of our deciduous shrub groups. But no, I would not so insult bedding out, oftentimes excellently done, by making it responsible for such slovenly, unsatisfactory work. Here you have generally a fair study of colour and form, and time of blooming. In deciduous shrub groups, on the other hand, small plants even are frequently huddled where large plants ought to be, and *vice versâ*. Perhaps you will say this is mere captious fault finding. I can do no more then, in defence of these assertions than tell you briefly what I consider a well-planted shrub group. Assuming, first, a knowledge of the seasons of blooming and the colours and forms of shrubs, I would look at any hill-side group of wild plants and get what hints I could from their arrangement. In short, I would ordinarily plant my shrubs 4 ft. apart—in rare cases 3 ft.—dig only a circle of about 1 ft. in diameter around the plant, and fertilize liberally on the top of the ground. Frequent spading for cultivation is as necessary here as ever, and is generally neglected. The grass must, of course, be kept neatly trimmed among the plants, and though the use of a sickle be found necessary at times, the improved and cleanly appearance thereby attained will fully repay all trouble.

And now a word as to arrangement. It is commonly the habit, where any defined system of arrangement is attempted, to place the large plants in the centre and the low ones on the outer edges. In a general way this is correct, if the work be not executed in a formal manner. Such grouping is, however, not strictly correct from the standpoint of natural planting. Here and there through the mass, even to the extreme end, taller plants, such as Tamarisks, &c., should be so disposed as to give an irregular wavy sky line. No sharp transitions in height should be allowed; that is, a shrub adjoining this specially tall one should not be sufficiently small to make a sharp contrast. Again, plenty of shrubs of the same variety may be massed in the centre of the group, but on the outskirts more numerous varieties may be disposed. This applies, however, only to groups of considerable size. Smaller groups may be planted with shrubs, each of a different variety. Trees of moderate size may be planted in the group instead of the larger shrubs, which ordinarily should form the high points of the sky line. Large shrubs or low trees dotted singly near points of outer curves also increase the natural effect. Due regard should be given to scattering different colours about the mass, so that a number of red flowers, for instance, may not be crowded in one spot, and none at all be seen elsewhere. The same management should apply to the arrangement of the plants which bloom at different seasons of the spring and summer. I doubt not that many will wonder that so much study should be given to a group of shrubs. But it would not be thought much if it were once understood, and the effect is really greatly superior to the common style of nondescript arrangement. In conclusion, I should say what has already been implied, that culture is obtained in this way as well as in any other. It is also in place to call attention here to the yearly necessity of pruning shrubs, at the special season when provision is best made for flowers during the coming year.—S. PARSONS, in American *Country Gentleman*.

## TURPIN'S CAVE IN EPPING FOREST.

THE precise spot at which the Loughton earthwork is best exposed for observation is in the pit known as Turpin's Cave. Shocking as it may sound to antiquarian ears, writes the *City Press*, there can be no doubt that Turpin's Cave is much better known in Epping Forest than the Loughton Camp, beneath the wall of which it has been excavated. It is, in fact, one of the most popular and, to some minds, thrilling exhibitions of the forest. And yet Essex is by no means poor in caves and dens of the earth. The ancient British troglodyte, returning to his native land, would still find ample underground dwellings ready for his use. Indeed, the caves of Essex are among the oldest and most interesting of its antiquities. The mysterious subterranean chambers in Hanging Wood not only tempt the footsteps of the Saturday afternoon rambler to-day; for centuries they have sorely perplexed the antiquaries who have examined them. The central shaft down which we descend some 60 or 80 ft. deep; the wide chambers at the base in which we find ourselves as we peer into galleries around—supposing our light not to have been extinguished, and our breathing to have been unimpeded by the stagnant air; the skeletons of the *feræ naturæ* of the forest, unlucky victims of these fateful traps, which crack beneath our feet as we tread the dubious floor and cautiously venture into the gloom—all these lend romance to the descent into these ancient caverns. Such are the mysterious "Danes' Holes," as they are called by the peasantry around—sacred and safe places of refuge for the scared inhabitants at the time when old sea-rovers, the predatory Siguards and Thonds, were wont to ravage the shores of the Thames. To-day these immemorial "earthworks," if we may so call them, have yielded up their secrets. The archæologist has at length learned the objects of their excavators, as we may hereafter show. Suffice it for the present that Turpin's Cave in Epping Forest, as viewed by antiquarian eyes, can scarcely rival the "Danes' Holes" in interest. It is not, nor ever was, a subterranean cavern. It is an open pit. The roof of wattles and boughs has long since vanished, but once they sheltered the most renowned of modern knights of the road, when the inns of Epping—those favourite haunts of the highwaymen of the Newmarket road at the beginning of the eighteenth century—were closed to his visits. Such at least are the cherished traditions of the old settlers round the forest. Certain it is that the memory of Turpin is cherished at Epping, as at Chadwell Heath. Turpin's Cave is as much one of the exhibitions of Epping Forest as Turpin's Oak is of Finchley Common; and who shall begrudge to the admirers of each, in these unromantic and prosaic days, the indulgence of their tastes!

## TREES IN TOWNS.

A paper on this subject was read by Dr. Phenè before the Social Science Congress at Edinburgh, supplementary of one read a twelvemonth ago. He contended that amongst the beneficial results accruing from trees being planted in towns was the relief to the optic nerve through the eye resting on objects of a green colour. Just that which was effected by the use of green or blue glasses in strengthening and sustaining the power of sight was attained, or at any rate much aided, by the presence of green in Nature; and in streets the only method to procure this result was by planting trees. It was pointed out that wherever opportunity exists Nature provides green and blue, the same colour without the presence of yellow, and that as the absence of colour produced snow-blindness, so in tropical calms, where the ocean presented only a white reflected light from a uniform glassy surface, reduced optical power would soon follow a long continuance of the absence of the blue colour, which became immediately apparent on the motion of the waves.

So in the streets, to the occupants of houses having a northern aspect, the glare of the reflected light was injurious; but the effect would be much modified by the coolness to the eye produced by the green of trees. In ancient surgery, persons having weak or declining sight were advised to look at the emerald. It was shown that in the old style of building, the streets being narrow, were both cooler, from the sun not being able to penetrate them with direct rays, and less subject to noxious exhalations from the scouring and purifying effects of the searching air to which narrow streets were subject, so that while there was no space for trees there was also less necessity. Wide streets, on the contrary, were hotter, and required the shade of trees to cool them, and, as in the case of London, which had so far done without trees in its streets, it was pointed out that not only were modern streets compulsorily wide, but that the enormous increase in metropolitan buildings rendered every sanitary question one of importance; and the chemical properties of trees, as shown by experiment, gave them an important standing on that ground, irrespective of ornament or the pleasure they produce. Some of the author's experiments had extended over thirty years, and he was, he believed, the first who tried planting trees in the streets of London. Since the reading of his paper at Manchester, and the importance of the subject, as shown from the resolutions of public meetings and those of the society, and the reports in the *Times*, a number of streets in wealthy localities had been planted, and even Trafalgar-square, in the heart of the metropolis. But that which was important in such localities was more imperatively demanded in poorer districts, on the score of health, as during the last year alone 21,000 new houses were erected in London, producing 400 streets, with 71 miles and 468 yards of promenade.

## TREE PLANTING IN MANITOBA.

A correspondent of the *Times*, who a few years ago spent his holidays in travelling through the State of Minnesota, to which, and to the neighbouring British province of Manitoba, much attention has lately been directed as advantageous fields for emigration, thus remarks on the absence of forests in the British province:—

"On the American side I found a very frank recognition of the value of Manitoba and of the great Saskatchewan valley as a wheat-growing territory. Its great want was said to be timber. This is borne out by the encouragement held out by the Manitoba Government to settlers who will plant a certain number of acres with forest trees. I found several immigrants who had crossed the English border into Minnesota, and they always gave the lack of timber as the reason for their leaving Manitoba. They were of the poorer class of immigrants, without the means to buy timber to make themselves and their cattle comfortable in the winter and to fence their farms. The principle which should, in my opinion, guide emigrants to these fine regions is as follows:—A man with some capital, say £1,000, may safely select a homestead on the prairie at some distance from the forest, because he can buy a framed house and sheds, &c., and the facility of reducing the bare land to cultivation compensates for the first outlay thus incurred. But the poorer class of emigrant should select his homestead at or near the forest. There he will have abundance of timber to build his log-hut and sheds, and to fence in his fields, and keep himself and family warm in the cold winters. This particularly applies to English emigrants who cannot, of course, bear cold so well as men from the North of Europe, of whom a great many emigrate to Minnesota.

"Speaking generally, the prairie land is of inferior quality to the timbered land. None but good land can grow heavy timber. The stumps of oak and other hard woods soon decay, but pine stumps are very intractable and take many years to disappear.

"The neighbouring settlers are generally very ready to join together and help the new comer to build his log-hut. His arrival is an excitement for them, and his propinquity adds to the value of their property and the cheerfulness of their lives.

"The Manitoba Government would act wisely in planting tracts of 1,000 acres or so with a mixture of fast and slow-growing trees, the former to act as nurses to the latter and to be cut out and used up when they had performed that duty. I doubt much if so small a plantation as ten acres would do much good to the climate, but this is a matter in which experience alone can guide. At all events, no better investment for the Government could be made than large plantations wisely distributed throughout this noble country. The cost would be small and the profit certain and not remote. The idea of giving emigrants a bonus in land for planting is certainly a good one. Unless shelter and warmth, as well as food, are easily procurable, immigration cannot advance rapidly. Young trees should, of course, be provided gratis by the Government, which could raise them very cheaply."

## BENGAL FOREST ADMINISTRATION.

From the Bengal Forest Administration Report for 1879-80, we learn that the area of reserved forest in Bengal amounts to 2,945 square miles, of which 1,581 belongs to the Sunderbuns, leaving only 1,364 square miles for the rest of the three provinces. It was intended to have added 1,800 square miles to the area in 1878-79, but this addition was found impossible to complete as the necessary arrangements could not be made in time. The addition will, however, be made during the current year, and will consist of tracts in Singbhoom, Chittagong, and other divisions. Mr. Gamble strongly urges on the Darjeeling tea-planters to extend the timber reserves, wherever practicable, by preparing nurseries of young plants, and by bestowing the necessary care on the seedlings to protect them until they are sufficiently grown for transplanting. He gives the names of a few suitable trees for elevations up to 7,000 feet, amongst which we remark the *toon*. This is a very hardy, fast-growing, and handsome tree; its timber is, moreover, valuable in several ways. An area of 139 acres was added during the year to the Government plantations put out from time to time; these plantations now aggregate 953 acres. If a few hundred acres could be thus planted everywhere and there, over the whole country, wherever suitable localities could be found, the public would soon hear the last of famines arising from a deficient rainfall. The efforts that are now persistently made to protect forest land from fires, the result of accident, carelessness, or design, have been very successful during the year. The only district where serious fires occurred was Palamow. The firewood arrangements, in reference to the Sunderbuns, are working admirably, and the profit accruing to the department from this source is considerable. The receipts from the Sunderbuns Division for the year amounted to Rs. 1,87,324, and the expenditure to only Rs. 37,720, leaving a balance of Rs. 1,49,604.

The unreserved forests under departmental control consist of a small tract in Julpigoree, which will eventually be brought into the reserves, and of 5,100 square miles of open forest in Chittagong. Sir Ashley Eden regrets that the Government of India has so reduced the number of superior officers in the department in Bengal, "and the further weakening of the department by the transfer, elsewhere, of officers of local experience," that he does not see his way to give the officers so much leave as he would like. He is fully alive to the fact that, for long periods of the year, these officers are necessarily exposed "to malarious influences, which must render a fair amount of leave absolutely necessary for all." This is highly creditable to the Lieutenant-Governor, and will no doubt be appreciated by the forest officers serving in Bengal. The resolution closes with a well-merited compliment to Mr. Gamble.—*Indian Agriculturist.*

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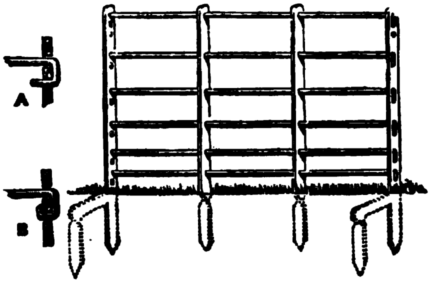
## HURDLES WITHOUT RIVETS.

Messrs. Bayliss, Jones & Bayliss, of the Victoria Works, Wolverhampton, have introduced into the market a new hurdle, in the manufacture of which the ordinary method of riveting the horizontal bars to their terminal uprights is discarded. The plan adopted is that of cutting the horizontals to the proper length and preparing each end for fixing (as shown at Figs. A. and B.) by bending and bringing it to a slightly-tapered point. The intermediate uprights employed are in all respects like those generally used, but the terminal uprights, or sides, in addition to the ordinary set of holes, have a second set punched about an inch below that pierced by the horizontal. In the make-up the cross-bar is threaded through the upright, and projects 2 in. or more at either end. This projection is afterwards turned downward, threaded backward into the upright, and clenched on its inside surface. This operation is performed on cold iron, and in the result a very rigid and substantial hurdle is produced. The manufacturers state that hurdles made upon this principle will be found the strongest, cheapest, and most rigid ever offered.



**Relic of an Old Forest.**—During a recent boring for water in the Wimmera district, Victoria, a tree was passed through for a distance of 6 ft. at a depth of 250 ft. Several fruit stones were brought to the surface. At some period in the world's history a grove of trees probably occupied this spot, and the great depth of earth now covering the remains of the vegetation indicates a vast lapse of time since it flourished.

**The Blackwood Tree of Australia.**—This very handsome and valuable tree, *Acacia melanoxylon*, cannot be well known in Britain, as it is not mentioned in Johnson's "Gardener's Dictionary." A plant of it grew for about a dozen years in the garden of Cromla, Corrie, Isle of Arran: but the situation was unfavourable, the ground being very wet. It was at length transplanted, but died. In the month of September, last year, a friend presented me with a fine young plant, which I placed in the same garden in Arran. Last winter was the most fatal to shrubs that I have known, but the acacia was uninjured. This year the same friend has given me another plant of this noble tree, which I have been permitted to plant in one of the best situations at Brodick, Arran. As it is of very rapid growth, it and the one at Corrie will soon become a tall and very ornamental tree.

**Timber Region of Texas.**—The timber region of Texas is chiefly confined to the eastern part of the State, though belts of timber are found farther west. The rivers are more or less fringed with forests of greater or less depth, but the growth is generally of a low character, the exceptions being on streams that course the timber proper. The timber regions occupy 45,250 square miles, or one-sixth of the entire area of the state. The oak is most frequently met with species of tree in the State, and includes the kinds known as the port, overcup, white, red, pin, water, live, black, and Spanish oaks. On the river bottoms, sycamore, pecan, poplar, and gum are chiefly found. Pine of the long and short leaf species is confined to the main body of timber in the eastern part of the State. In south-east Texas alone, embracing an area of 11,943 square miles, 3,974 square miles are covered with miscellaneous timber, including oaks, beech, maple, elm, ash of three varieties, magnolia, black walnut, red cedar, black, yellow, and white cypress, gum, and several kinds of bay, about 983 square miles are covered with short-leaf and hammock pine; and 4,466 square miles with the long-leaf yellow pine.

**Sale of a Small Estate in Dumfriesshire.**—The lands of Crawston, Dunscore, extending to 153 acres, and rented at £223, were recently exposed for sale in the King's Arms Hotel, Dumfries, at the upset of £5,500, and sold to Mr. J. Symons, solicitor, Dumfries, for Mr. Nelson, of Friars' Carse, at the price of £5,650.

**Planting in Ireland.**—Mr. Charles Russell, in his "New Views on Ireland," which have lately attracted a good deal of attention, says that the want of timber in that country is sorely felt. He therefore proposes that the commission for setting right the affairs of that country should be authorized to deal with the waste lands, purchased by them, which could not be profitably reclaimed for tillage, or otherwise utilized, so as best to promote the planting of trees.

**The Orange.**—The orange is the longest lived fruit tree known. It is reputed to have attained the age of three hundred years, and been known to flourish and bear fruit for more than a hundred years. No fruit tree will sustain itself and produce fruit so well under neglect and rough treatment. It begins to bear about the third year after budding, and by the fifth year produces an abundant crop, though the yield is gradually increased by age and favourable circumstances. The early growth of the orange is rapid, and by its tenth year it has grown more than it will in the next fifty, so far as its breadth and height are concerned; but it is age that multiplies its fruit stems.—*Indian Agriculturist.*

**Sale of a Cumberland Estate.**—The estate of Aspatria, adjoining the Brayton estate of Sir Wilfrid Lawson, Bart., M.P., has just been purchased by that popular baronet, for the sum of about £11,500. This addition to his estates will make Sir Wilfrid the chief landowner in the district between Carlisle and Maryport.

**Sale of a Yorkshire Estate.**—The large estate of Hambleton, in the North Riding of Yorkshire, has recently been bought by Carl Bolckow, Esq., of Marton Hall, Middlesborough. The estate extends to something over 4,000 acres, and the price paid for it is said to be about £100,000.

**Shocking Death of a Forester.**—At a village near Dunfermline a singular accident, resulting fatally, has occurred to James Stauth, a forester, while chopping a tree. One of the blows missed the tree, and the axe cut through the man's right foot at the instep, causing him to bleed to death in about twenty minutes. The deceased was fifty-four years of age.

**Sale of a Small Estate in Lancashire.**—The Crimble Hall estate, belonging to the late Mrs. Fenton, consisting of about fifty-two acres of land, with mansion, gardens, and pleasure grounds, was recently sold by public auction at the Wellington Hotel, Rochdale, for £12,300, the timber on the said estate to be taken over at the valuation of £230. The purchaser is Vernon Armitage, Esq., Chaseleyfield, Pendleton, Manchester.—D. D.

**Sale of an Estate in Ayrshire.**—The eligible landed estate of Haylee, in the parish of Largs, was recently bought for the sum of £11,025, by Richard Brown, Esq., of Ayr.

**Eucalyptus Coccifera.**—We have a fine specimen of this Eucalyptus, planted about thirty years ago. Its height at the present time is 58 ft. The stem measures at 3 ft. 6 in. from the ground, 7 ft. 4 in.; at 10 ft., 6 ft. 4 in; and at 20 ft., 5 ft. in circumference. It withstood the severity of the two past winters uninjured. Our lowest temperature registered was 23° of frost. It produced an abundance of bloom about the middle of June on almost every spray, giving it a handsome and novel appearance. The plant is fully exposed to the south, east, and west, but sheltered from the north by hills and woods. It is growing on the edge of abrupt rising ground, at the base of which runs the river Kenn, and in front for some distance are swampy marshes. The soil is a sandy loam, with a subsoil of red sandstone. From the position of the tree and the character of the soil it will be seen that it is well drained, and naturally very warm. We had *Eucalyptus globulus* (the blue gum) killed by 12° of frost. A specimen, 23 ft.

high, with a stem 9 in. in circumference at 3 ft. 6 in. from the ground, was killed down to the soil. I saw a fine specimen of the same kind at Salcombe (South Devon) 30 ft. high, well branched and uninjured. 14° of frost were registered there, but it is exposed to the sea breezes.—D. E. POWELL, in *Garden*.

FINE YEW TREE.—At the residence of Mr. C. Woodward Wallis, Ankerwycke, Bucks, there is a monster yew tree in the prime of life. The circumference of the stem at the ground is 24 ft. 6 in., and at 3 ft. up a little over 30 ft., and at 5 ft. 6 in. up, immediately under several great branches, it measures over 36 ft.; its age has been variously estimated at from 1,000 to 2,000 years.—H. T., in *Garden*.

THE EVERGREEN COTONEASTERS.—These just now look fresh and cheerful, while many of their associates are bare. Whether for planting in shrubberies, for covering sloping banks, or in the case of smaller kinds, for planting on rockwork, or even on a lawn, a fine mass of the Cotoneasters is really charming, and they will succeed in positions too shady for most shrubs. The principal kinds are *C. buxifolia*, the strongest grower in this section, and one which forms a spreading bush of from 6 ft to 8 ft. high, with neat box-like foliage of a fine dark green colour. *C. rotundifolia*.—This differs from the last in the arrangement of the branches and leaves, which are disposed in a flat frond-like manner, bearing some resemblance to that beautiful Chilian shrub *Azara microphylla*. It is also of much smaller growth than *C. buxifolia*, being in that respect intermediate between that species and the following. *C. microphylla*.—This is altogether a charming little shrub, very suitable for rockwork, a character that is also shared by a still smaller variety, viz., *C. microphylla thymifolia*, while in *C. microphylla congesta* we have quite a creeping plant, attaining at most a height of a few inches yet covering a good-sized space of ground. There are many others named as belonging to this section of Cotoneasters in catalogues, but they are not sufficiently distinct to deserve attention.—ALPHA, in *Garden*.

BLACK WALNUT WOOD.—In connection with the subject of the uses of black walnut wood (*Juglans nigra*), referred to in the *Gardeners' Chronicle* for August 28 last, p. 263, we have recently received information from an undoubted authority that American black walnut is of no use for gunstocks, being too short in the grain, besides being gritty; and that the Americans even, who make some of their gunstocks out of it, prefer to buy for best work English, Swiss and Turkey wood.—*Gardeners' Chronicle*.

ROOKS PLANTING FIR CONES.—In answer to a query last week by one of your correspondents as to the reason why rooks plant fir cones, allow me to say that in the "Forest Trees of Britain" I find the statement that rooks carry away fir cones to a quiet spot in order to eat what they can of them, leaving the rest to vegetate. Also sometimes the rooks are seen actively engaged in burying the cones, perhaps intending them for food at some future period.—J. GIBBERNE, *Epsom*. [In Robinson's "Essay Towards a Natural History of Westmoreland and Cumberland," published in 1709, is a curious account of his having watched a flock of rooks (he calls them crows) planting acorns on a spot where, twenty-five years later, he lived to see a grove of oaks growing high enough for rooks to build in.—ED.]—*Field*.

ODD FELLOWS' LIBRARY ASSOCIATION, SAN FRANCISCO, CAL.

# EDITORIAL NOTES

Last month we briefly referred to a proposal which had been made to establish a School of Forestry in Epping Forest, and through the courtesy of the author of the suggestion, Mr. Alexander Mackenzie, Superintendent of the Forest, we are enabled in our present issue to lay the full text of his report on the scheme before our readers. The matter is one of the deepest interest at the present moment, and the public are greatly indebted to Mr. Mackenzie for the able and intelligent manner in which he has proposed and expounded a really practicable scheme. The extensive area of Epping Forest in its present dilapidated state affords space and verge enough for inculcating a large amount of practical skill, as well as for displaying an abundance of good taste, before it can be restored to anything like a well-managed and picturesque woodland, approaching in all its main features to the wild beauty and romantic grandeur of a natural forest. In the work of demarcation, draining, road and bridge making, planting, pruning, thinning, and general forest management, there will be much of a technical nature for the student to observe and learn for many years to come; and the proximity of the Forest to London renders the acquirement of every branch of scientific knowledge of the most approved description, a matter of ease and certainty.

We do not require to recapitulate here what we have already so often quoted—the numerous and weighty opinions of the most eminent men, who are best qualified to judge—of the great necessity there exists for a School of Forestry in this country, where our most promising youths can be thoroughly trained and educated, so as to qualify them for filling the highest appointments connected with forestry, and more especially for supplying foresters of education, skill, and ability for the management of our home forests and plantations. It is the latter class of foresters which more especially concerns us and for whom—in these times of land agitators and severe agricultural distress—landowners, as well as the Government, ought to display a greater amount of interest, by exerting themselves as a body to get such an institution created with the least possible delay. Till home wants are efficiently supplied, and the reproach that our English forests and woodlands are not "managed with either economy or skill" is removed, the training of foresters for India and the Colonies cannot be expected to receive the public attention and thorough investigation which the importance of that part of the subject so urgently demands. The establishment of a British School of Forestry for home supply, renders the home education of candidates for appointments in the Indian and Colonial Forest Departments a matter of course, which will necessarily follow. Had a British Forest School been in existence, the ruinous system of sending the candidates for appointments in the Forest Service of India abroad, to learn what can be better taught at home, would never have been inaugurated.

We trust that the present favourable opportunity of making an effort to supply a much-felt want will not be neglected by those whom it most deeply concerns, and that the Corporation of London will add another to the many educational and other benefits it has already conferred on the metropolis and the country, by adopting Mr. Mackenzie's suggestion, and at once instituting a School of Forestry in connection with Epping Forest. The Government ought to lend material aid in carrying out any such scheme, because the nation will receive by far the largest share of the benefits arising from it. To go no farther than the Crown forests, they appear to be much in want of a staff of trained and skilful foresters, so as to make them of some creditable value to the State, and as profitable to the public purse as the well-managed woods and plantations on any private estate. The addition of *one shilling* per acre to the miserable pittance at present derived from the Royal Forests and Woodlands, would produce more than sufficient to clear the annual expenditure on a School of Forestry, and we are convinced that proper management on the part of the Government and the officials would soon add *ten shillings* per acre to the revenue derived from the Crown Woodlands.

It may be objected to the scheme set forth by Mr. Mackenzie that Epping Forest is chiefly intended as a recreation ground for the teeming multitudes of the metropolis; and that neither in the New Forest nor at Windsor are to be found the best managed and most profitable forests in the country. Nevertheless, it appears to us that the best should be made of things as they are,—first, because these lands are all public property, and can be easiest devoted to such an important public purpose without trenching largely on any private rights; and second, because there is no prospect of the Government taking up the project on its own account and establishing at an early date a School of Forestry in a more eligible district, as a national institution. Under these circumstances we hope to see the present proposal put into execution, somewhat on the lines sketched out in the report, so that the country may no longer be reproached for the want of an important educational institution possessed by every other state in Europe.

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THE sayings and doings of the Scottish Arboricultural Society are evidently watched with increasing interest by intelligent foresters throughout the country, as the contents of our "Editor's Box." prove in our present and recent issues. We are gratified to note the fact, although we are not prepared to vindicate the propositions of every critic of the Society's work, no more than we are inclined to support the Society should we find it pursuing a course detrimental to the best interests of forestry, in the most comprehensive form to which that term applies. The Society has done, and is doing, most excellent work; and to a certain extent fulfilling the duties performed by a Government Department in the other states of Europe, since it is the only institution, or constituted authority, on matters connected with forestry, that we possess in Britain. Still, it by no means fills the void in this country, which is becoming more and more felt every day, of an institution wherein our youth can be taught and trained to fill the highest offices connected with the profession, and perform the important duties devolving upon foresters in these times. The Society must show a lively interest in its work, and avail itself of every practical and wise suggestion, by whomsoever tendered, if it means to keep in the van of arboricultural science and practical improvement. Much important and useful work is done at its annual meetings and excursions, and by the premiums it offers for essays and reports on arboricultural subjects; but a far wider field is now before it, which it must make a strenuous effort to fully occupy, so as to raise the standard of our arboricultural knowledge to the highest state of proficiency, and disseminate the same in the best possible manner amongst those who are in any way interested in the success and the progress of forestry.

To enable the Society to perform these important duties with success, every landed proprietor, forester, and arborist in the country ought to make a point of assisting it in some tangible form; either by contributing to its funds, joining its ranks, competing for its premiums, or supplying help and information of a useful kind bearing on any branch of forestry, by which the work and efficiency of the Society can be most effectually promoted. In return for this general and powerful support, the Society will then be in a position to take up many schemes of the greatest importance to forestry and foresters, which will give such an impetus to the profession and science of arboriculture as will prove most beneficial to the individuals concerned, as well as contribute in an important degree to the progress and prosperity of the country at large.

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THE lecture delivered by Sir Richard Temple, Bart., late Governor of Bombay, before the Society of Arts, on "Indian Forests and Forest Conservancy"—a summary of which we lay before our readers on another page—indicates the strong feeling which is springing up in the public mind in Britain, that the thorough conservancy of the forests of India can no longer be neglected or treated in haphazard fashion; but that a thoroughly efficient system of management must be inaugurated, and the preservation of existing forests, and the creation of new ones where they are wanted, must form a primary factor in our future government of India. We do not require to follow Sir Richard in his able treatment of the several parts of the subject, in the relation of forests to climate, and their imperative necessity to supply the economic wants of the teeming population of India; but we fully endorse his opinion, that a due proportion must be maintained between the forest and cleared land, so as to reap the greatest advantages to the country, and that the balance must be as soon as possible restored in extensive areas where it is now so largely deficient, or, in some instances, where forests are entirely absent.

We are also gratified to note that he holds the same views which we have always advocated, concerning the selection and training of young men to fill the appointments in the Indian Forest Service. Coming from one who has had the wide experience of Sir Richard Temple, the opinion which he has expressed, that we ought to be able to educate and train these young men at home, carries an irresistible weight with it which the most plausible advocate of the present hybrid system will find considerable difficulty in explaining away. It is undoubtedly the right course to pursue, and the sooner the India Office sets to work to establish a training institution in this country, the sooner will the Indian Forest Department be the remunerative success which it ought to be. The country has already had more than enough of the useless and expensive foreign system of training that has hitherto been followed, and which was to a certain extent perforce adopted in the earlier days of the Indian Forest Department, but which at the present time is totally inadequate to meet the wants of the British empire. A School of Forestry must be instituted in Britain, and one of its objects, although not necessarily the primary one, will be the education and training of candidates for the Indian Forest Service. The time has certainly arrived when the best interests of the nation demand a full supply of thoroughly educated foresters, trained in every branch of the science and art of forestry, and the authorities are wofully neglecting their duty to the country, if they do not successfully establish such an institution at an early period.

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We are again passing through a winter of unusual severity; and we fear that the losses among trees and shrubs will be even heavier than in the disastrous seasons of 1878 and 1879. Such a succession of severe winters has not occurred since a large number of our choicest conifers and other trees have been introduced, or at least since they have been extensively used for ornamental planting, and there is sufficient reason for considerable apprehension that many of them will succumb to the trying ordeal which has overtaken them this winter. An extraordinarily heavy fall of snow early in the season, when many of the deciduous trees had not yet shed their leaves, made sad havoc among oaks and other trees in many parts of the country. Then this has been followed by one of the heaviest snowfalls and keenest frosts which the country has experienced for many years; and we hear from our correspondents that in many districts of the country the recent intense frost has severely injured, if not killed, many trees and shrubs which had survived the two previous hard winters. Add to this the destruction of limbs, and often whole trees, by the great weight of the superincumbent snow, and the hosts of trees levelled to the ground by the unwonted force of the gales which have swept over many parts of the country, and we have a total loss probably exceeding anything which has taken place during the present century.

The record of these losses is always of interest (although carrying with it a certain amount of regret, especially so when some grand old tree has met its doom), and we shall be glad to receive from our correspondents and readers an account of any losses among the trees and shrubs which they have observed in their neighbourhood. Also the mention of any of the rarer and more tender trees which have unexpectedly survived, is of particular interest; indeed, it is always more pleasant and of greater importance to notice the survivors than to record the killed and wounded. Communications should be sent to us at as early a date as possible, after the full effects of the severity of the winter have shown themselves.

# The General Work of the Estate.

By ANDREW SLATER, Rose Cottage, Loftus-in-Cleveland.

(*Continued from page* 572.)

## Wire Fence with Wood Straining Pillars and Posts.

Straining pillars of wood should be well seasoned and of the best quality. Oak without any sapwood is the most durable. Logs that will square to 14 in. without any sapwood, and then cut into scantlings 7 in. square, make the best straining pillars, as the heart is removed and the wood is not so liable to split when exposed to the sun. A log that will only square 7 in. will split in all directions when exposed.

The pillar should be stayed below and above ground, as shown by the annexed figures. Dimensions of sole, 7 ft. 7 in. by 3 in.; it should be fixed to the pillar with a cleat on each side and well nailed.

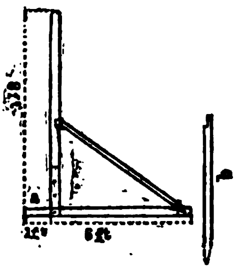


Fig. 1.

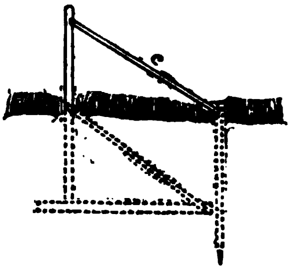


Fig. 2.

Fig. 3.

A trench 7 ft. long, 18 in. wide, and 4 ft. deep will be necessary for a pillar of the above dimensions.

At *a*, in Fig. 1, the sole of the pillar projects one foot behind, and to receive that part a hole should be undermined the same depth as the sole, on a level with the bottom of the trench. When the pillar is placed in the trench it can then be slipped back, till the back of the pillar is hard on the end of the trench. The projection will then assist in resisting the strain of the wire.

A piece of wood 6 ft. long, 12 in. or more broad, and 4 in. thick, checked at the top as at *b*, to receive the lower end of the stay *c*, (Fig. 2) should be driven till level with the surface of the ground and hard to the end of the trench.

The earth should be put into the trench 3 in. at one time and be well beaten in every part. Much depends on that part of the work being well performed.

The upper stay *c* should be mortised in to the pillar and nailed; it should be made of well-seasoned oak or larch; 3 in. square is the lightest that should be used, and that only for fences of light wires.

When all the pillars in the line of fence are set, holes for the wires should be bored at the proper distances. Plates 3 in. by 2¼ in. thick, with a hole in the centre, as shown in Fig. 3, sunk in the back of the pillars, one for each wire,' prevent the wires from cutting into the wood. They are useful also for keying the wires before being tied.

Where abrupt hollows occur between straining pillars it may be found necessary to place strong intermediate posts with soles and double stays underground to prevent the wire from pulling the common intermediates out of the ground. These should be bored to pass the wires through, not stapled. They are very useful where sharp curves occur, and if they are of sufficient breadth no stay will be necessary.

When all the pillars and intermediates are properly fixed the wires can be strained and stapled as before directed.

Corrimony fences may be made either wholly of iron or of wood and iron. They are very suitable for boundary lines where no deviation is allowed, sometimes close to brooks with rugged banks. It sometimes happens that it is almost impossible to fix standards of either iron or wood firmly on such lines.

They will also prove very acceptable where fences are required on peat bogs, or on any situation where there is a difficulty in fixing the straining pillars or intermediate posts; on such boundary as already stated, the distance from standard to standard can be varied to suit the inequalities of the bank, by placing them where a good hold can be got.

If the ground is uneven on the surface, rising and falling, it will be necessary to place standards in the hollows to keep the fence an equal height from the ground, but on comparatively level ground 36 ft. may be placed between the standards, or more on a pinch.

The intermediate standards will require to be stronger than in other wire fences of the same height. If they are of wood for a fence for cattle 3 ft. 8 in. high, 5 in. by 4 in. will be strong enough. The length will vary according to the hardness or otherwise of the ground in the line of fence. In ordinary subsoils 6 ft. will be sufficient.

On peat bogs, where the peat may be from 10 to 36 ft. deep, and that will not bear horses, but where the material has to be carried along the line of fence by men, I have found it difficult to erect a wire fence at all. The difficulty consisted in fixing a straining pillar. I have driven a pile 10 ft. long and 6 in. square into the peat for the purpose of fixing a back stay to the straining pillar, and found it of no use whatever. No sooner was the wire tightened than the straining pillar and pile followed the strain of the wire, rendering all the previous labour of no use whatever. I have no doubt but that self-fixing standards of iron could be made to answer the purpose, but I have not seen any, neither have I found anything in any of the diagrams in the price lists in my possession that would be of any use as a straining pillar in a peat bog.

I saw that there could be no resistance in the peat against the strain of the wire with ordinary pillars, and I tried hard to find some way to meet and overcome the difficulty, and succeeded by enlisting the lever as a power to resist the strain of the wire. The following figure is a representation of the pillar and sole.

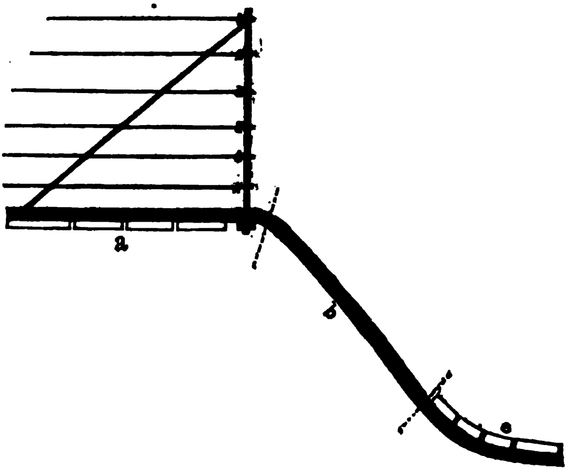


Fig. 4.—Scale ¼ in. to the foot.

The sole is part of a tree of the requisite shape; the less chipping required so much the better, as if much shaping is necessary it may be thecause of weakening it by having to cut across the grain of the wood.

I have used oak, elm, alder and old Scotch pine for these soles. Single trees of the proper shape, if of sufficient diameter, may make two or more, and trees with large limbs may be found to suit the purpose well. I have cut four out of an old stunted elm, the limbs serving as levers. It is necessary that the sole should be so much bent that it will reach to a depth of 5 ft. at *c* in Fig. 4, so as to admit of a sufficient weight being placed on the lever to resist the strain of the wire.

The sole should not be less than 5 in. thick, and 9 in. deep, and 13 ft. long.

Fig. 5 is a plan of excavation for sole and lever. That part of the figure 6 ft. by 5 ft. and marked *a* should be cut 15 in. deep and covered with planks 6 ft. long and 3 in. thick, as shown on the plan, to resist the pressure of the sole at *a* (Fig. 4). At *b* (Fig. 5) the trench can be cut to correspond with the slope of the lever and 5 ft. at *a*. The cross trench, 6 ft. by 3 ft., must be cut 4 ft. 3 in.; it will then be level with the upper side of the lever when placed in position. The sole should then be put in its place, resting the level part across the planks as shown at *a* (Fig. 4), and the lever *b c* in the trench cut for them. Planks 6 ft. long or strong slabs must be placed across the end of the lever at *c*, the width of the trench, namely, 3 ft. These should be well nailed to the sole (or lever) to prevent it slipping with the strain of the wire. The peat should be well beaten into the trench at *c*, that as much weight as possible may be placed upon the low end of the lever. The sole may be made to extend beyond the lower end of the stay if the peat be very soft; additional bearing of planking in that case will be required. The sole will require to be covered with peat at least 3 in. to preserve it from decay.

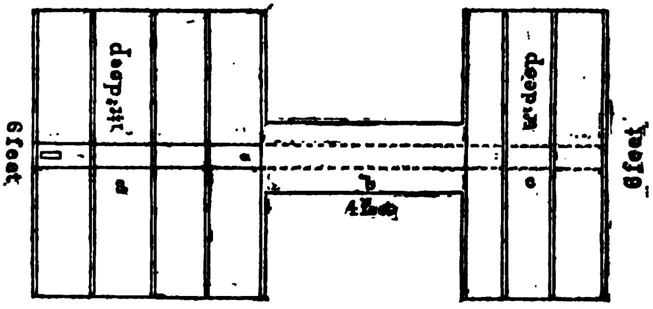


Fig. 5.—Scale ¼ in to the foot.

The intermediate posts, if on the corrimony plan, will require to be driven 3 ft. into the peat. They should be 6 in. by 4 in., the broad face to the wire giving the greatest resistance to pressure from stock.

Peat bogs are generally level, and where the line of fence is straight 300 yards may be placed between the straining pillars and 36 ft. or more between the intermediate posts. Droppers of wood are sometimes used. They may be either fixed on with staples, or have holes made to run the wires through. The latter plan is very troublesome and expensive. If adopted, droppers, 2 in. by 1½ in., made of oak, will be strong enough; if of soft wood, 2 in. by 2 in. will not be too heavy. If staples are used, droppers 2 in. by 1½ in. will answer the purpose, and staples of No. 10 wire made to rivet. The staples in this case should be driven hard home on the wire, and riveted on the back of the dropper; this makes the wires like a web, and makes a very good fence.

### STONE WALLS WITH WIRE ON TOP.

These fences when well erected are very serviceable, both as a fence and for shelter for stock. Stone walls without wire, as a fence for black-faced sheep, will require to be not less than 5 ft. high, and unless the coping be of a jagged form that height will not be proof against their leaping propensities.

The through-bands, coping, and bases for iron standards in drystone fence walls should be well bedded in lime, and the coping should be jointed with it. It adds greatly to the stability of the fence. The through-bands should be of an equal thickness throughout. If thicker at one end than the other they may do more harm than good, by causing the wall above them to slip off. Where a fence of wall and wire is to be erected, it will be necessary to decide for what kind of stock the fence is required. If for sheep only, 2½ ft. wall, with three wires on top, will be a sufficient height, or 3 ft. wall with two wires on top. The latter will be more costly if the stones have to be carted any distance, as the wall will require to be wider in proportion to the height. If it is required for cattle and sheep, a wall 3 ft. with three wires on top will be necessary. The same height of fence will do for horses, as they are not apt to leap over wire. The greatest danger with them is running against the wire before they become acquainted with it. I have seen horses when put to grass for the season being led along the fence, and made to face it repeatedly, and to touch it with their neck and breast until they became aware of its position. This was done in a quiet and kindly way with the animals, and the result proved quite satisfactory. The foundation for a stone fence wall should be excavated till a firm bed is obtained, and even on level ground where it is firm, 4 in. in depth should be cut out, to prevent the foundation course from slipping to either side.

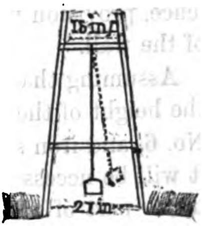
Where a wall fence is to be erected up a steep slope, the foundation should be cut in steps, so that the foundation-stones may all rest level in the line of fence. If laid on the slope without stepping, the whole mass would have a tendency to crush down-hill, and though not actually moving bodily, it would, if the gradient was steep, press so much that the building would become loose, and be forced out of line on either side.

In the case of a wall fence being erected along the side of a slope, the foundation should be cut deeper on the upper side of the line of fence, as the lower side will not be so firm, being nearer the surface, and for that reason allowance should be made for subsidence of the lower side of the fence. The fence for the same reason should be built with less batter on the upper side than on the lower side.

Where any form of fence wall is to be erected, the land should be well drained, if not the fence will soon become loose. The severe frosts in winter swell up the ground where it is "waterlogged," and raises whatever rests upon it, and this rising and sinking has a very damaging effect upon the fence.

Broad flat stones should be used in the foundation course, projecting at least 3 in. beyond the width of the wall at the surface of the ground. All open spaces between the stones should be carefully packed with suitable stones, well bedded, and not shovelled in, as is sometimes done by careless and unprincipled contractors and their workmen. The foundation course being laid, a frame of the same form as a cross section of the wall will have to be procured. It should be supplied by the owner of the fence.

The following figure (Fig. 6) is a representation of a frame for a 4 ft. wall, 27 in. wide at bottom, and 15 in. at bed of coping. The figure shows the height of wall, coping included, the upper cross bar the height of building only. The plummet in the centre indicates the proper position of the frame when set for a fence, of equal batter on both sides, but where more batter is required on one side than another, such as on hill-sides, the frame can be set till the requisite batters are obtained. When that is done, the lower cross-bar should be marked where the plumb-line strikes, as shown in the figure by dotted line and plummet.



Scale ½ in. to the ft.
Fig. 6.

Good wall builders will bind the work as they go along, by placing the longest stones at equal distances more than halfway across the building on one side, and on the next higher course on the opposite side the longest stones to overlap those first laid. Builders of that description should be employed even at a higher remuneration than those who take no interest in doing the work well, but make all face that will be face by laying the longest stones lengthwise in the run of the fence, and fill in the heart of the wall with any rubbish they can lay hold of.

The first course being laid and well packed, the stones of the second course should cover the joints of the first; in other words they should break joint, otherwise the wall will be weak, however much care may be exercised in the other parts of the work. Through-bands should be placed every 3 ft. in the line of the fence, and not more than 18 in. from the surface of the ground.

It is often stated in specifications for building fence walls that the through-bands shall project three or more inches on each side of the wall. This is done as a check upon the contractor. It is a stipulation that is easily evaded by placing two projecting stones opposite each other. A case of this kind came under my own notice once where the builder had ventured rather far in the cheating line, and placed a whinstone on one side of the wall, and a freestone on the other side. The number of courses of through-bands in the wall will be regulated by the height of the fence; 15 in. is wide enough after the first course.

The coping on ordinary fences is best of rough stones hammer-dressed on bed and joints only, leaving the top rough. Cattle are not so apt to rub on a rough cope as on a smooth one, and sheep do not leap over them if the cope is rough and jagged, as they would over a smooth-dressed cope.

Dressed cope is of various forms, and some prefer one form and some another, without being able to give any good reason, but that they think their cope the best. Where wire is to form part of the fence, provision will have to be made for fixing it during the erection of the wall.

Assuming that a fence for sheep only is required, and that 2½ ft. is the height of the building, cope 9 in. deep included, with three wires No. 6, and iron standards 1¼ by ¼ in., and 3 ft. long, placed 7 ft. apart, it will be necessary to place through-band stones 7 ft. apart, and the upper part of these should be, when set, 12 in. below the top of the cope, the wires to be placed 7 in. apart, and the same distance above the cope. Straining pillars will require to be fixed in heavy stones with long stays fixed in the cope.

Where the intermediate standards require side-stays, it will be necessary to project the base stones a sufficient distance beyond the face of the wall for a support to the stay, or otherwise to use standards of greater breadth, with forked feet, to make them self-staying. In that case the feet would require to be placed as the fence will admit of.

Fences of the above description are easily rendered rabbit-proof by fixing 18 in. wire netting to the wires. Fences of greater height can be erected in the same way, but a 4 or 5 ft. wall will require two wires. A corrimony fence might suit well on a straight wall, and would cost less.

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The Forests of America.—Mr. T. Meehan states that "in the States of Virginia, Tennessee, and North Carolina, there are, at the present time, millions of acres of magnificent forest trees. Among these are white oak, red oak, and the tulip poplar, in immense quantities; with a great quantity of species, useful but less known, used in the leading arts, such as beech, birch, elm, sweet gum, black or sour gum, buttonwood, linden, cucumber, and other magnolias, ash, sugar, and other maples, locust chestnut, and horse chestnut, walnut and hickory, enormous sugar berry trees, and dogwoods larger than in the north, besides many others interesting to the botanist, but for which the special uses have yet to be found. Besides these, there are among the resinous trees immense quantities of the yellow pine *(Pinus tædà)*, bull pine *(Pinus mitis)*, and post or Jersey pine *(Pinus inops)*, which grow up into forests of straight trees, very different from what we find them in New Jersey and Pennsylvania. Besides these are Hemlock spruce in some quantity, white pine in less, and in still smaller quantities balsam fir *(Abies Frasers)* and black spruce *(Abies nigra)*."

# Forest Conservancy in India.

On Friday evening, January 21st, Sir Richard Temple, Bart., G.C.S.I., delivered an interesting lecture before the Society of Arts, in London, on the above subject. He entered first of all into a description of the principal trees which flourish in India, both in the plain and hilly districts. He referred to the deodar, or cedar, as being one of the most useful of trees. Of the teak, he remarked that it possessed every virtue of which wood is capable: it was good everywhere and under all circumstances, being seldom attacked by insects; its appearance always strikes the eye, as it rises straight up from the ground. Then there was the Sal, commonly called "ironwood" on account of its great strength and durability; it has a tall, straight trunk, with fine head. Of the *terminalia* there were two useful kinds; one had a white and the other a black stem; one resembled a pillar of white marble, and the other a black column. Among trees of the plain, he mentioned the acacia (*babul*) which was used for every purpose of daily life; also the mangol, which, besides furnishing a suitable article of food for the masses of the people, was fairly valuable for timber. He referred to the great forests of the Sunderbunds, extending for thousands of square miles. There were indiarubber trees, bamboos, and several varieties of the palm, the date, the palmyra, and the cocoanut, which latter tree supplied almost every want, and was so valuable that even one or two constituted quite a little property.

Sir Richard spoke in glowing terms of the many other useful trees in India, and then came to the question how all this fine natural wealth should be preserved. But, he remarked, the trees are valuable on two accounts, one being *economical* and the other *climatic* As regards the former, there are not less than thirty-seven millions of inhabited houses in British India, and the majority are made of wood. It might be imagined, then, what an enormous demand there was for timber for house-building alone. Most of the domestic implements of the people are made of wood. There were not less than half a million villages in that dominion, and assuming that in each one there were from fifteen to twenty ploughs, it might be imagined how enormous was the demand for wood for agricultural implements. Then, as regards carts, they must be counted by millions; and as for fuel, there was in most parts of India an absolute want of wood, and consequently the people used cow-dung, which ought to be reserved for manure.

As regards the climatic influence of forests, there are many people who consider that the droughts of India are caused by the destruction of the forests. Too much must not be made of that. There is a certain amount of evaporation from the Indian Ocean. He did not suppose the total rainfall of the continent of India can be affected by forests, but the *distribution* of it is very much affected. The clouds pass over the dry plains and go straight on to the mountains. They arise in the Indian Ocean, and the first obstruction they meet with is along the western coast. They sweep over the dry plains of India, and meeting with the mountain ranges, their vapour is there condensed and causes torrents and rushing streams which swell the rivers making floods in the valleys, which could be prevented if forests were on the plains: a cold surface is presented to the clouds, and causes them to condense. If there are no forests, the clouds pass on until stopped by the hills. The same principle applies to the vapours which sweep over the plains of Bengal and are stopped by the great mountain ranges. In regard to how forests affect the distribution of rainfall if there are no forests, the chances are that at one time there will be drought and at another time immoderate rains, a period of flood almost always following upon a period of drought. It is to the forest that we must look for being blessed with the early and latter rains in due season.

The next point in reference to climate, is the retention of moisture. If the vegetation is destroyed, the streams run dry unquestionably. If the vegetation is preserved, the moisture is preserved for the dry season. This is important in those parts of India where canals exist, and if we are to retain our canal system, the forests must be preserved.

One more point in reference to the climatic consideration, and that is the preservation of pasturage. The cattle in India have too much food at some seasons and too little at others, the consequence is that they suffer from hunger during the dry months, and are apt to surfeit themselves at the commencement of the annual rains. The great object is by preserving the forests to preserve the grass during the dry seasons. If there is a certain amount of forest land, grass will be sheltered from the sun and thrive so as to be fit for the cattle.

More ought to be done on the plains of India for the establishment of forests. Every village should be induced to establish a forest, which would afford a certain amount of timber and fuel, and also tend to preserve grass for the cattle.

These are the main reasons in brief why the preservation of forests is a matter of such vital concern in India. He now came to the measures to be taken for preserving these forests, and sorrowfully admitted the neglect of this subject which has prevailed in former years. Nobody was more zealous than he in vindicating the conduct of the Indian Government and its officers, but he must admit that in the preservation of forests, we have not until within the last twenty years done as much as we ought to have done. Want of knowledge and technical education has contributed to the partial destruction of this great source of natural wealth, so essential to the well-being of the country. We have now a large staff of trained forest officers; he wished he could add that they had been trained in this country. He referred to the project which had been started for establishing a school in Epping Forest, and said that hitherto our Indian forest officers have been trained in France and Germany, and it must be allowed that the school at Nancy has turned out excellent foresters. He could not see why it should not be done in England. A large forest was not necessary for teaching the profession of forestry, there are plenty of available woods in England, Scotland and Wales.

We have now in India a Forest Department, which was second to none in the world. What does this department do? The remaining forests are divided into two great categories by law. Firstly, reserved forests, which are absolutely preserved; and secondly, protected forests, which are imperfectly guarded and preserved. To give an idea of the extent of these forests, he would mention the area in square miles. Bengal presidency, 51,000 square miles; Bombay, 13,000; Madras, 5,000; making up a great total of 69,000, say 70,000 square miles. This will be augmented by the many square miles yet to be marked off. He ventured to say that within a few years we shall have not less than 100,000 square miles of forest in India. The greater portion is imperfectly protected, but still he thought nearly half was well preserved; at least 25,000 square miles are thoroughly guarded and preserved, and the whole of the great area named is under some protection. What does this preservation and guarding consist of, and to what purpose is it protected? It is first directed to the matter of wood-cutting. The forests are not treated by the Government in a dog-and-manger fashion. The timber is wanted for the use of man. Trees are not preserved for ornament, but use. As soon as a tree is grown to its full height and maturity it ought to be cut. In many cases the trees grow so thickly that thinning them is a positive benefit. The restrictions upon wood-cutting are not absolute, but instituted in order to ensure a number of trees being left for reproduction.

The next point is to regulate the practice of "*rab*," which means that the young shoots of the trees are burned, and their ashes, which contain the necessary chemical constituents, are used for manure especially where the natural manure, viz., cow-dung, has been used for fuel. This cutting shoots and burning for ash manure, is a practice, which, if not regulated, will cause great damage to the forest. It is necessary to a certain extent.

Another matter is the prevention of the jungle fires, which are partly accidental and partly intentional, and when they are accidental present some of the most magnificent spectacles that can be imagined. Many people have been all night in the midst of these fires, which rush over the country, travelling at the rate of several miles an hour, the animals flying before the flames in terror, the inhabitants of the forest being caught in the flames, and Europeans galloping to escape from the conflagration. The racking of the trees sounds like artillery; the trunks form pillars of fire and smoulder for a long time.

Fires are also intentional, and lighted up every year to ensure a plentiful crop of fresh green grass for the cattle. That, to some extent, is permissible in the months of April or May. Many of the hill tribes carry on their agriculture not by ploughing, but by means of burning the forest and letting the ashes lie upon the ground until the rain comes. This is a barbarous practice, and arises from the ignorance of the people, and their want of agricultural appliances. In extenuation it may be said that certain localities are very steep, and not easy to plough. The object of the British Government is to wean these people from the practice, by making small advances of money to them whereby they may purchase cattle and ploughs, so as to depend upon agriculture rather than burning the forests.

Forest conservancy is directed towards the preservation of the grazing. If cattle winter in the jungle, they will destroy ten times as much as they eat. The object is to restrict the grazing by means of the block system, to allow the cattle to graze in certain blocks or areas of the forest, and to prevent them in others, so as to preserve the vegetation.

It will readily be perceived that when a question arises tending to restrict the rights of the people, there is always a contest between the forest officers and the civil officers. People who live in the forests have been accustomed to burn and destroy trees, and they can only be reclaimed by degrees; while on the one hand their rights are protected, on the other hand they must not be allowed to destroy the forests. In a judicious manner forests must be preserved, while a fair consideration is given to the old-established customs of the country.

Among the most distinguished Indian foresters he mentioned is Dr. Brandis, a German Inspector-General, at once scientific and practical, and the author of an excellent work entitled "The Forest Flora," and his distinguished countryman, Dr. Schlich. There was also

Dr. Cleghorn, of Madras; the late Dr. Stewart and Mr. Baden Powell in the Punjab; Messrs. Pearson and Forsyth in the Central Provinces; Beddome and Campbell-Walker in Madras; Dalzell and Shuttleworth in Bombay; and Seaton and Ribbentrop in Burmah. These have struggled to preserve our forests with a considerable measure of success; they have endured many toils, and risked their health, some of them even losing their lives in the service of the forests of India.

In conclusion he ventured to think this subject was worthy of the best attention of the Society of Arts.

In reply to the invitation of the Chairman, Mr. Andrew Cassels, who invited discussion, Dr. Cleghorn stated that he had been much interested by Sir Richard Temple's graphic description of the forests of the Indian Empire, and the result of 20' years Departmental administration. It was extremely desirable that correct information should be promulgated on this important subject, and no one had wider and more general knowledge than Sir Richard Temple, who had steadily given the weight of his great influence to Forest Conservancy, and his commendation was most gratifying to an old forest officer. The Department was formed in Burmah in 1855; Madras, 1856; Upper India, 1861; and the First Forest Act in 1864, amended in 1878. He referred also to the evils of denudation, due in a measure to the ramification of railways, which for fuel alone exhausted the forests for miles on either side.

Sir J. Fayrer expressed his tribute of admiration for the encouragement Sir Richard Temple had always given to the science of forestry, than whom no Government officer had done more. On sanitary grounds he argued on behalf of the preservation of the forests.

Sir W. Robinson did not think much of the climatic consideration, and thought that the Government should act with great caution so as not to trench upon the rights of the people.

Mr. Bottley thought that the extension of agriculture in India should be encouraged in every way.

A vote of thanks was passed for Sir Richard Temple's interesting lecture, and the latter in returning thanks said that one twenty-fifth of the empire was under forest conservation, but that area, instead of being too much, was too little. He added also that it was for the welfare of the natives these regulations were made, and that there was a very large quantity of unreserved and village forests.

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**Destruction of Trees in Ireland.**—The violent scene at Springfield, near Williamstown, on the borders of Mayo and Galway, which occurred recently, was followed by the assembly of a large mob in front of the house of Captain Bodkin, which they would have burned down but for the bravery of Captain Bodkin and the constables in charge. They destroyed trees and fences however, to the value of £600.

# Are Trees injured or benefited by the Decomposition of the Prunings which may surround them?

By D. McCORQUODALE, Forester, Dunrobin, Sutherlandshire.

The readers of the *Journal of Forestry* who feel interested in this subject will remember how, in the May, June, and August issues, I examined the injuries done to pine trees in this country by insects, and how I considered these injuries under four different classes, and briefly described these four different classes which did the injuries, and at the same time gave a typical example of each. The second class referred to runs thus: "Those which feed on dead or decayed trees, and we will take as our example the case of *Hylobius abietis*, the fir weevil. . . . . Although these insects may be numerous and very destructive to young plants, I am not aware that either Mr. McCorquodale, Scone, or anybody else found them do harm to any plantations, say five years old, or to young trees about 3 ft. high, their habitat being the tree rubbish on the ground, where they can do no more injury than the earth-worm or other similar insects." With regard to the above statement we find Mr. Sym Scott say (page 472): "No such limits are to be found. I have seen trees attacked much older and taller than Mr. McCorquodale has been aware of, which shows the absurdity of building up theories on the limited observations of a single individual." At page 526 I asked Mr. Scott to kindly tell us how much older and taller were those he saw attacked, and where, but this he has not told us as yet. Will he also strengthen his own "individual observations" by quoting other acknowledged authorities in support of his statements?

In referring again to the subject, he tells us in the last issue that a whole crop of mangolds was sadly destroyed by the mangold fly, and that no other field was known to be affected by them in the district. Will he kindly inform us, first, what means, if any, were used to prevent the total destruction of the crop of that field? Second, what the value of the crop of mangolds would be per acre if uninjured by these insects? Third, if the farmers in the district were so much alarmed about it as to be at the expense of tearing up all their crops of mangolds, and of bringin them to the outside of their fields and there burning them, so as to prevent these insect pests from further extending their depredations?

In page 217 of the *Journal,* I called the attention of readers to the tremendous multiplying powers these insects had, and the larch bug in particular. In page 220 I pointed out how the Ichneumon family of flies, with their probable 3,000 distinct species, were capable of preventing in a great measure a dangerous increase of herbivorous insects, and feel glad to find in page 581 that Mr. Scott agrees with me in this.

In page 221 I expressed a doubt if the Ichneumon flies could be the whole cause of the sudden disappearance of caterpillars, and gave reasons for believing in some species of fungi being as destructive perhaps to herbivorous insects, if not more so, than the Ichneumon flies. Will Mr. Scott kindly express an opinion on this?

In referring to this subject, Mr. James Craig says in your last issue, that I have been "confounding one insect with another, and leading us," &c., and goes on to say: "For instance, there are two large pine-eating weevils, *Hylobius abietis* and *Pissodes notatus,* which are most destructive upon young newly-planted fir trees, especially in the neighbourhood of old fir plantations." With regard to this, if he reads page 241 of the *Journal,* he will find me distinctly saying that I took *Hylobius abietis* as an example merely, of that class of insects, without pretending to say how many varieties there are of them. In Mr. Craig's estimation I am evidently mistaken in stating that in this country the pine weevil does no injury to fir trees five years old, or say 3 ft. high; and in support of his views, he wishes me to read pages 81 and 131, Vol. VII. Scottish Arboricultural Society's *Transactions.* If he reads page 131 again himself, he will find it does not strengthen his theory. In pages 80 and 81 to which he refers, Mr. Wm. Tivendale, Forester, Houston, Paisley, mentions how very destructive he found them in a plantation three years old, which, let me here observe, is two years younger than the age I said. But further on Mr. Tivendale says, "In the case of older trees, it makes no attempt to eat the rough bark on the bole, but seeks its way to the branches, and preys upon their tender bark. Here it does not eat the bark all round as it does on the stems of the young tree, but makes an attack here and there on the upper side of the branch, and seldom, if ever, makes a second attack at precisely the same place, which is the cause of their being far less injurious to large than to small trees. I find that the wounds they make in the bark of the branch soon heals, leaving the tree little the worse."

This appears to be all Mr. Craig can advance in support of his opinion, that the weevil does damage to trees older than five years.

I am glad to find Mr. Craig admitting that the pine caterpillars not only eat the pine leaves, but that they are also hatched on them. Will he kindly say where a plantation of Scotch fir a hundred years old can be seen, and that was at that age attacked by the pine caterpillar? I still wonder what can be the local circumstances that could cause he pine caterpillar to disappear as referred to in the *Journal*, page 213. It is perhaps worthy of note that Mr. Craig saw a "plantation badly infested with them cleared by a flock of rooks in a few hours!" Did anybody else ever see the like done? It seems strange how the rooks could refrain from enjoying such delicious morsels until a *whole plantation* became "badly infested with them." Rooks no doubt might pick off a very great many caterpillars, but as to being the whole cause of so large a quantity disappearing in a *few hours* is quite a different thing, and requires some further explanation before I for one can believe it.

Mr. Craig admits that "decaying branches, &c., are the proper food of trees after their kind." Will he explain what he means by "after their kind"? No doubt he will also grant that in destroying the rubbish by fire or otherwise money is spent and tree food wasted which might be saved. But then he says decaying branches and tree rubbish "have their injurious effects as well, in being the breeding places of many mischievous insects;" will he oblige us by saying what these insects are?

Mr. Craig has some fir plantations, the trees forming them being from 4 to 10 ft. high, and suffering from the ravages of the pine beetle. He finds most damage done near clumps of old Scotch fir, and if he thinks that these insects have been bred among the *decaying rubbish* in the old fir wood, perhaps he will tell us the *facts* which led him to form such opinion.

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**Evils of Earthing up Tree Trunks.**—I would caution any one from top-dressing hard-wooded trees in such a way as to cover their stems, for, although trees that emit roots from the old wood may not be injured thereby, there are a great many, both deciduous and evergreen, that should not be so buried. Top-dressing, to be of any service to the active roots of established trees, does not require to be placed close to the stem, as there are generally but few active roots there, especially in the case of dense-leaved evergreens, like most of the coniferæ, the soil being dust-dry close to the stems even in winter. On the contrary, the majority of active rootlets will be found quite as far from the bole of the tree as the tips of the branches. This, therefore, will be the best place to apply assistance in the shape of top-dressing, and from examination of the soil under coniferous trees, I feel sure that their greatest want is moisture; for, even when we are reading of floods occurring in all directions, the soil under the dense top-growth of these trees will be found to be quite dry, and any one having surplus water to dispose of cannot do better than entirely flood the land in the vicinity of their roots, for ordinary rainfall is quite insufficient to maintain large specimens in perfect health and vigour.—J. Groom, in *Garden*.

# The Ash Tree (*Fraxinus*).

By ALFRED J. BURROWS, Land Steward, Pluckley, Kent.

Distinguished alike for its beauty and its usefulness, the ash forms one of the most ornamental of our timber trees. Whether growing upon the margin of the lawn, where its open and spreading head affords a marked contrast to the more compactly grown yew or cedar, *Picea pinsapo* or *Wellingtonia*—in the open park, where it droops freely, and afterwards recurves, attaining its most picturesque forms,—in the hedgerow, where the lopping and pruning to which it is often subjected sadly mars its effect as a landscape tree, or in the close plantation, where, with suitable soil, it soon overtops its neighbours, the ash seldom fails to become "a thing of beauty," and to produce a striking effect. In height it is generally between 40 and 60 ft., and in circumference from 5 to 6 ft.; but when it grows in a rich loamy soil and meets with sufficient moisture, it sometimes attains 100 ft. in height, with a proportionate circumference.

Both on account of the delicate green of its leaves, and the gracefulness of its growth, this tree is much esteemed by the ornamental planter and the landscape gardener. Virgil says of it, "*Fraxinus in sylvis pulcherrima.*" The ashen spear is a classic weapon, and to the dexterous use of it many of the heroes of old owed much of their prowess. What is commonly called the Walnut-leaved Ash is by far the most ornamental tree of the species. In old age the ash, though often very picturesque, loses much of its gracefulness of form. As the branches become broken by the wind, new growths often start out at right angles to the stumps, producing forms the most fantastic. When the tree grows in a shallow soil upon rock, or in a very wet peaty soil, it is no uncommon thing to find its roots running for considerable distances upon the surface of the ground, and there displaying endless twists and contortions. The name *Fraxinus* is derived from the Greek word meaning a hedge, in allusion to the tree's most common place of growth. The ash is well adapted by the lightness of its foliage to the outsides of clumps, and by its towering habit of growth in close quarters, to give effect in the centre of a mass of other trees.

1. *The Common Ash* (*F. excelsior*) is indigenous to Great Britain, where it is found growing in good soils from the northern part of

Scotland to the most southern counties of England. It also grows freely in the Scandinavian peninsula, as well as in Russia and the south of Europe. Its graceful leaves, lanceolate-acuminate in shape, are slightly stalked, smooth, and serrated. The spike-like flowers start out from the sides of the branches. Often late, as it is, in bursting into leaf, and frequently early in parting with its foliage, it is on this account sometimes shunned by the planter, who takes only a superficial view of natural objects. But even when divested of their leaves the branches of a well-grown ash tree are deserving of admiration. The wood is tough and flexible, and is on that account much sought after by the coachmaker and the cartwright. It is used in the manufacture of ploughs, harrows, axle-trees, felloes, spade-handles, axe-helves, &c., and where easily obtainable, it is also in request for forming the planking of light pleasure-yachts. But to ensure the durability of the timber the tree should be felled in the winter, that is, between the latter part of November and the beginning of February.

When only a few years old the ash proves useful in many ways. The early falls afford poles for lances, wood for the turner and the cooper, as well as material for crates in the pottery districts. When of larger growth it is useful to the hop-grower, and to the cooper for hoops for vessels of large size.

The tree may be propagated from seeds which ripen towards the end of October. If these are gathered, dried, and then kept in sand for a period of eighteen months, and regularly turned, they will spring up soon after they are sown. They should be sown in a fine, moist, and deep soil, and covered with not more than three-quarters of an inch of earth. By the following spring the seedlings may be transplanted into lines, where they will stand 15 in. apart, with a space of 4 in. between the plants. From two to three years in the lines, or a longer time if required for situations where they are liable to be choked with briars, and they are fit for removal to the woodlands. The timber owes much of its value to its having no distinct sapwood; but as it is very apt to open and exhibit large shakes when left in the log, it should be quickly planked. *The Weeping Ash* is only a variety of the Common Ash, and as its effects are produced by engrafting, they generally convey the impression of having been produced by artificial means.

2. *The American* or *White Ash* (*F. Americana*) grows abundantly on the banks of the North American rivers, and is generally straight in form, often attaining a height of 70 ft. Its wood is light-brown in colour, clean in the grain, and very elastic. It produces the best boats' oars. Its growth is very much slower than that of our English trees, and the wood is supposed to be less durable. Much of it comes here in a manufactured state, as boats' oars and handspikes. The

logs imported are generally from 20 to 35 ft. in length and from 10 to 18 in. in the square.

3. *The Canadian Ash* (*F. Canadensis*) comes here in logs from 20 to 40 ft. long, by 10 to 16 in. square. It is also imported as oar-rafters. The wood is of a reddish-brown colour, straight-grained, tough, and elastic. The timber is used in Canada for most of the purposes to which our Common Ash is applied.

4. *The Flowering Ash* (*F. Ornus*) is a tree of low growth with leaves of a lucid green, which are of equal growth and lanceolate in form. A variety called *F. paniculata* presents, when in flower, a loose panicle at the end of each branch.

5. *The Manna Ash* (*F. rotundifolia*) has shorter shoots and leaflets of a lighter green, and more deeply serrated than the leaves of the Common Ash. The purple flowers appear before the leaves in spring. Its growth is not generally much above 15 ft. It was once abundant in the mountains of Calabria. The manna was obtained from it by making incisions in the bark, through which the juice flowed freely when the trees occupied favourable situations.

## THE LATE MR. WILLIAM GORRIE.

We much regret to announce the death of Mr. William Gorrie, who enjoyed a high reputation in the northern part of the kingdom as a forester and landscape gardener. As a member on the Committee of the *Transactions* of the Scottish Arboricultural Society, and as president and subsequently vice-president of the Edinburgh Botanical Society, Mr. Gorrie rendered great assistance to the cause of arboricultural and botanical science, through his vast experience and knowledge. In the Arboricultural Excursions which the Scottish Arboricultural Society has organized of late years, he was always to be found to the fore, freely bestowing the treasures of his vast knowledge of trees and shrubs on all around him. He was an occasional contributor to the pages of this journal, and as lately as the 30th December he sent us an interesting extract from the recently published life of Elihu Burritt, which will be found on another page of the *Journal.*

Mr. Gorrie came of a race of tree planters and gardeners. He was born in the Carse of Gowrie, Perthshire, but spent the greater part of his public life about Edinburgh. Whether as land factor, as manager at the late Mr. Lawson's nursery, or latterly as forester and consulting landscape gardener, he won golden opinions. As one said, he never made an enemy. His many valuable papers and reports in the *Transactions* of the Arboricultural, the Highland and Agricultural, the Botanical, and other societies, are well known.

On Thursday, the 6th January, he started for Dumfriesshire, remarking how well he then felt. He climbed a high hill throughout the day; reached the Edinburgh station of the Caledonian Railway in the evening nothing amiss; when the train on the Leith branch stopped at Newhaven to collect tickets the porters found him dead, apparently of heart disease, in the sixty-ninth year of his age. Among his numerous friends many Professors, foresters, and gardeners, gathered lamenting round William Gorrie's grave in the Warriston Cemetery, Edinburgh, on Tuesday, the 11th January.

# The Diseases of Larch.

By J. McLAREN, Forester, Hopetoun House.

In an unsuccessful essay written by me seventeen years ago (for the Scottish Arboricultural Society), in the advocacy of the more extensive introduction and cultivation of the newer coniferæ, the following paragraphs occur in regard to larch disease, which may not be uninteresting at the present time, viz.:—

"The larch, which has been admitted to be the most profitable crop of all the firs, has of late become a very precarious one, especially in the south of Scotland, the cause of which has not been fully accounted for, and so long as the cause remains a hidden, or, at best, a doubtful question, no adequate remedy can be rightly suggested, while its discovery might, after all, only show to us that it is beyond the power of man wholly to check it. Some writers, anxious for a cause, lay all the blame upon the forester, some upon atmospheric influence, and others upon the constitutional weakness of the plant. I think all the three have a share in the matter; for although it must be admitted, and regretted, that the forester, in many cases, has been blameworthy for not consulting soil and situation, as it is well known that larch planted in a dry, sandy soil is liable to dry rot, and those in a soil surcharged with wet will not thrive, yet my opinion is, that under the most favourable circumstances larch is not now the profitable and safe crop it was in former years in this country, the cause of which, I fear, is altogether beyond the power of the forester; for even when planted in soil congenial to its nature—a sandy loam, with a cool and rather porous subsoil—with other outward favourable conditions, its branches are often more or less infested with larva, while its trunk is covered with ulcerated wounds, through which the vital sap exudes, thus retarding the growth, and, in many cases, destroying the plant altogether. There is no doubt that the aphis—the larva above alluded to—has materially added to the general deterioration and unhealthiness of the tree; but as that insect has been comparatively rare for the last thirty-six or thirty-eight years—that is, compared with its abundance during the four or five years previous we might naturally expect a corresponding return to vigorous growth during the period exempt from its attacks; but such can hardly be said to be the case, as the unhealthy condition of the trees everywhere strikingly testifies; so that we are driven to look to other causes as co-workers with the aphis in producing the evil complained of. There is much reason to believe that the summer frosts are the main cause of the ulcerated wounds on the trunks. The larch, being an early plant, is much sooner stirred to vital activity than most coniferæ, is consequently more exposed to the sudden and hurtful changes to which our climate is liable.

"This is confirmed by the fact that ulcerated wounds infest larches more in the southern part of Scotland (where the spring is somewhat early) than in those parts in the north, where the spring, through being late, is not so liable to sudden transitions of cold. Even trees planted on a northern exposure are also, from the same cause, freer from them. I fear much, however, that atmospheric influence and constitutional weakness are the great causes of the decay of vigour in the larch. It is a well-known fact that where a constitution, whether animal or vegetable, is weakened, by whatever cause, it is more liable to disease, and less able to bear it, than a sound and unimpaired one. Now that the constitution of the larch has become weaker, few who are acquainted with its history since its introduction to this country in 1738 will doubt, so that, as a natural consequence, we may expect it to be more liable to atmospheric influence and disease, and less able to resist both.

"There is another deteriorating cause, though a minor one, for weakness in certain individuals. Thus, it is a strange phenomenon regarding most coniferæ, that stunted and ill-thriven trees produce more cones than healthy, vigorous ones, and it frequently happens that a tree, immediately before its decay, is heavily loaded with cones, the seed strength of which must be considerably weakened by its being, as it were, the last effort of nature to propagate its kind. These cones with others are collected by seed gatherers, whose main object may be to procure a quantity regardless of quality, and thus, the plants reared in the nursery are, from the very condition of their source, tainted with the decay of the parent stock. Even the foreign seed is not exempt from baneful influences, for the system so extensively practised in the native countries of the larch, silver fir, and spruce, of extracting from the living tree its resinous juices, familiar to us under the names of oil and spirits of turpentine, liquid balsam, and the common black and yellow resins of the shops, must, through a period of years, vitally impair the native vigour of the family."

Although I have in the foregoing paragraphs given my opinion about larch pretty strongly, it must not be supposed that I altogether condemn the planting of this fir—far from it—but I would plant it on sound land, not on moss or marshy soil, as the frost takes a far greater hold of plants in such soil than it does on those planted in sandy loam, or even clay.

# Notes on the Subjects discussed at the Annual Meeting of the Scottish Arboricultural Society.

By JAMES KAY, Forester, Bute Estate, Rothesay.

## The Hedge-Cutter.

I expected that after the trial of the celebrated "Hedge-cutter," there would have been a definite expression of opinion given as to its merits. It is questionable if the machine has ever been tried in presence of a greater number of persons more capable of judging of its merits, but up till now no one seems to have had the fortitude to do so. As every one is entitled to his own opinion, I beg to state that, though the machine is most admirably got up, it nevertheless fails to perform its work satisfactorily. In short, had I a man who could perform his work no better I would simply send him home, or try to find a job more congenial to his capabilities. I believe it was urged that the hedges were not in good order, and that the machine did not get a fair chance; but I think the hedges were in every way favourable to the trial, and if hedges are to be dressed in every few years to suit the machine, I fail to see its advantage.

## The Education of Young Foresters.

In regard to the education of young foresters, the subject seems to be as mysterious as ever. But if the best use were made of the means already at work a considerable advance might be gained. I refer more particularly to the *Journal of Forestry*. I do not know its present circulation, but this I know, that it is not developed as it ought to be.

[Mr. Kay here touches on the price of the *Journal of Forestry* and other matters which are the business of the Publishers, and of them alone, and as Mr. Kay has no means whatever of forming a judgment on the subject, and has no practical suggestion to offer, we prefer to omit his remarks. We cannot credit the assertion that under-foresters cannot afford twopence a week for a copy of the *Journal*, and even in those rare instances where such might be the case, it is quite possible for two or three to club together for a copy, and every facility is given them to do this.—Ed.]

### LARCH BLISTER.

The cause of the larch blister seems now to be better understood, and is in no small way indebted to the *light and heat* imparted to it at the last annual meeting. There is no doubt that extremes of temperature is the principal cause.

### BEECH APHIS.

I still adhere to what I stated at last annual meeting, viz.: that the aphis and honeydew on the beech hedges last summer were principally due to the want of moisture. And there is no doubt that honeydew is nothing but a species of fermentation of the natural sap caused by want of moisture at the roots, and excessive evaporation. In travelling through Lanarkshire last summer I observed the effects of the drought on many of the beech hedges. In one place in particular, where the hedge was growing on the top of a retaining wall, the hedge was completely blackened and shrivelled; while within a few yards, where the hedge was growing in an unlimited depth of soil, it was fresh and green.

### FLOW OF SAP IN TREES AFFECTED BY THE MOON.

This is no new idea, and was adverted to in an able paper by Mr. M'Neill, in the first part of the second volume of the Scottish Arboricultural Society's *Transactions* (twenty years ago). As showing how the idea is entertained in various countries, I take the liberty of making the following quotation from the paper referred to:—

"The callous indifference evinced by the members of the Arboricultural Society as to the questions annually submitted to their consideration is matter of regret, if not of reprehension; for how can we reasonably expect that *forestry* is to advance as a science or as an art without the interchange of thought and the consequent dissemination of ideas? . . .

"An opinion is generally entertained—and for that reason ought not to be ignored—that timber should be felled only during the decline of the moon; for if it should be cut during its increase, it will not be of good or durable quality. This opinion is neither local nor national, but prevails in various countries. An author of celebrity (some of whose works we have recently read) says that it is acted upon in England, and is made the groundwork of legislation in France, the forest laws of the latter country interdicting the cutting of timber during the increase of the moon. The same opinion is prevalent in Brazil. It is confidently affirmed by men of eminence that wood which is felled at the full moon is immediately attacked by worms, and very soon becomes rotten. In the extensive forests of Germany we learn that the same opinion is entertained, and acted upon with the utmost undoubted confidence in its truth. The physical cause assigned is, that the force of the sap is much greater during the increase than during the decrease of the moon; and it is hence inferred that timber which is felled in the first or second quarter of the moon, when the vessels are more filled with sap, will be spongy, and therefore more easily attacked by worms; that it will be difficult to season, and that it will warp and split by exposure to very slight variations of temperature; but that, on the contrary, timber felled in the third or fourth quarter, when the sap ascends with diminished force, will be more dense and durable, and fitter for the purpose of structure.

"M. Duhamel, a celebrated French botanist, made direct experiments for the purpose of testing this question, and clearly and conclusively showed that the quality of timber felled in different parts of the lunar month is the same. In order to prove this he felled a great many trees of the same age, growing from the same soil, and exposed to the same aspect, and never found any difference in the quality of the timber when he compared those which were felled in the decline of the moon with those which were felled during its increase. He adds, however, that by a circumstance which was doubtless fortuitous, a slight difference was manifested in favour of timber which had been felled between new and full moon, contrary to popular opinion."

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**The Great Beastern Railway and Epping Forest.**—Heaven made the country, and the Arch-itect enemy of man's happiness planted it with "semi-detached villas." That no "speculative builder" has been hanged at the entrance of one of his hideous settlements, says much for the forbearance of the multitude. Wherever there is a spot of beauty within reach of London the covetous hand of the demon is stretched out to grasp it. To-day High Beech is threatened; to-morrow it will be Burnham Beeches, and the next day the small remaining portion of Hampstead Heath. The Corporation of London, once the opponent of forest annexation, is now the ally of the Great Beastern Railway, which wants to make High Beech "more accessible." Who are the land jobbers at the bottom of this scheme, or the squatters in "eligible mansions," who wish to have a railway running into their bedrooms? Mr. Bedford, who deserves so well of the people for his work in Epping Forest, must look to this also. People who are afraid to walk or drive two miles in all weathers should live in Harley Street, Gower Street, Victoria Street, or some other London penal settlement—they are not fit for foresters.—*Punch.*

**Tree Planting in Dublin.**—The third plantation of trees in Sackville-street, Dublin, has just been carried out—the two former having ended in utter failure. "There is luck in odd numbers, says Rory O'More," and if the song sings the truth, the third planting will be a success.

# The Father of Forestry in Scotland.

## THOMAS HAMILTON, SIXTH EARL OF HADDINGTON, POLITICIAN, POET, AND PLANTER.

By SAMUEL NEIL, EDINBURGH.

SCOTLAND, in the olden time, must have been a well-wooded country. Its early ballads are full of the "flowering birk," "the bush of ash," and "the greenwood." Nutbrown maidens pass in them from "bower to hall," and meet their lovers in the "grene foreste."

> "While thro' aiken wood and birken shaw
> The winsome echoes rang."

The ballad of "Young Aikin," the forester of Elmond's Wood, attributed to the time of Fergus II., quivers with the romance of forest life; those relating to the "Gude Wallace" ring with the music of the "greenwood tree," and that which tells us of "The Outlaw Murray" assures us that

> "Ettericke Foreste is a faire foreste,
> In it grows manie a seemlie tree;
> And there's hart and hynd and doe and roe,
> And of a' wilde beastes grete plentie."

The proverbs of Scotland seem to bear the same witness as its ballads. Experience wrought into wisdom constitutes a proverb, and Scottish experiences have resulted in supplying such words of wisdom as these:—"He that would climb the tree must take care of his gripe;" "It's no easy to straught (straighten) in the oak the crook that grew in the sapling;" "Early crooks the tree that good cammock (the knee-timber of a ship) should be;" "Birk will burn be it burn drawn, and saugh (willow) will sab (droop) if it were summer sawn;" "A tree's no a mast till it's hewn;" "It's better sheltering under an old hedge than a new planted wood;" &c. In these forest phrases we see how much wood-culture has added to the wisdom of the Scotch.

Perhaps, however, the best evidence that Scotland must once have been a thickly wooded country is to be found in the remains of trees found in the peat mosses. In the unsettled state of the country during a long period of civil strife and border warfare large tracts were burned down, and the condition of the country was such as to have made planting an unprofitable investment, even had it been thought that plantations might be productive of wealth. Scarcity of timber in

Scotland resulted less from the nature of its soil and climate than from the sadness of its history. Trees grew in it by natural multiplication, wherever a fair opportunity for growth was given; but the contests of clans, the raids of moss-troopers, and the ravages of invaders, kept the land barren and the country bare. Here and there for shelter, for the supply of fuel and building materials, or for the pleasure to be had from the amenity they contributed to a house surrounded by them, trees were occasionally planted. But forest culture had not been tried. The old woodlands of the Caledonian forest shed year after year their annual seedings, and these grew up with little care from keepers, and little skill was expended on the maturing of timber. As articles of luxury, rarity, or beauty, trees of different kinds may have been, and doubtless were, planted near mansions and in the garden-grounds of the wealthy. But timber rearing was not an occupation. The man who introduced into his country the timber industries of the woodlands must have been a benefactor to it of no little worth. In this paper we intend to introduce to our readers a brief memoir of the first systematic, thorough, skilful, practical forester of Scotland—one of the earliest planters of woodlands as a profitable industry and a means of adding at once to national and to individual wealth, and the inaugurator of the Literature of Arboriculture in the northern kingdom.

The Right Honourable Thomas Hamilton, sixth Earl of Haddington and Baron of Binning, was the eldest son of Charles, fifth Earl of Haddington, and his wife Margaret Lesley, eldest daughter of John, Duke of Rothes, and as his heiress, Countess of Rothes. Their marriage contract provided that the eldest son (if any) should inherit the lands and titles of the father, and that the second should take the name of Lesley, and possess the property, and hold the older Elginshire earldom of Rothes. Charles, fifth Earl of Haddington, died in Feb., 1685, and Thomas, the sixth Earl, succeeded him. In 1687 this Thomas was appointed perpetual keeper of Holyrood Park, Edinburgh. The chief seat of the Hamiltons of Haddington, who, through their ancestor Thomas Hamilton, Lord Advocate and Secretary of State for Scotland, was ennobled 20th March, 1619, by James VI., was at Tyninghame, East Lothian. This parish, the name of which signifies the hamlet on the meadow-lands of Tyne, is situated in the best part of East Lothian, at the mouth of the Firth of Forth, and the land rises gradually from the shore of the beautiful bay of Tyninghame to the summits of Whitekirk Hill and Lawhead, about 257 ft. above the level of the sea. The Bass Rock, 350 ft. high and a mile in circumference, rises up out of the sea and strikes the eye with its Ailsa-craig-like mass, and recalls the memory of St. Baldred of the seventh and the State prisoners, Blackadder, Peden, &c., of the seventeenth century, as well as the historic fact that it was the last place in Scotland that held out for James II. and VII. On the right hand, about three miles westward, is Dunbar, at sight of which we recollect Baliol's defeat (1246), Black Agnes's heroic resistance to Salisbury (1338), Bothwell and Queen Mary (1567), and Cromwell's crowning mercy, 3rd Sept., 1561. To the left, nearer Edinburgh, we see

> "Tantallon vast,
> Broad, massive, high, and stretching far,
>
> . . . . . .
>
> Hung o'er the margin of the deep."

The chief castle of the Douglases of the bloody heart. The mansion-house of Tyninghame has been removed, but the woods by which it is sheltered and in which it is embowered—the woods which so brightly adorn the landscape and delight by their extent and beauty, owe their origin to Thomas, the sixth Earl, or we ought rather in justice to say, to his wife. She was Ellen, eldest daughter of John Hope, and sister of Charles Hope, first Earl of Hopetoun, and his own cousin. Their marriage took place in 1695, and in 1697 Charles, Lord Binning, was born. To him succeeded John and two daughters—Grizzel and Rachel.

In an able and valuable series of letters to his grandson and successor in the earldom, Thomas, the seventh Earl, son of Charles, Lord Binning, his lordship gives an account of the commencement of the planting of the estate of Tyninghame:—"When I came to live here, there were not above fourteen acres set with trees. I believe that it was a received notion that no tree would grow here on account of the sea air and the north-east wind, so that the rest of our family who had lived here either believed the common opinion, or did not delight in planting." . . . "I had no pleasure in planting, but delighted in horses and dogs and the sports of the field; but my wife did what she could to engage me in it, but in vain. At last she asked leave to go about it herself, which she did, and I was much pleased with some little things which were well laid out and executed. These attracted my notice, and the Earl of Mar ['Bobbing John,' subsequently the leader at Sheriffmuir], the Marquis of Tweeddale and others, admired the beauty of the work and the enterprize of the lady." Three ornamental clumps, radiating from different centres, were first formed by Lady Haddington. This method of laying out the woodlands conduced to the growth and contributed to the beauty of the plantation. Her success in these endeavours, and the pleasure derived from the variety they imparted to Tyninghame grounds, encouraged her to aim at greater works than these. A large extent of moorland, which it was impossible to reduce by tillage into either soft crop or grain-growing productiveness, but had become a sort of common, she proposed to take in, enclose, and plant. On her arranging on equitable terms with the neighbouring gentry and the surrounding tenants, who had acquired a sort of property in the moor, the Earl consented to the making of the forestal experiment she had planned, and in a short time, to the surprise of everybody, this wild, bleak, barren moor was covered to the extent of 300 acres into a thriving plantation. This second experiment in planting was begun in 1707, and the forest-land thus created she named, in honour of her son, Binning-wood.

During the time that these enclosures and plantings were taking their course at Tyninghame, under the care of the Countess, the Earl was more enthusiastically engrossed in the progress of national politics than she in the progress of her pleasure policies. It was the period when the empire was engaged in the Union controversy. On the accession of Queen Anne, Scotland had got divided into three parties: a national party, who in retaliation for the position taken up by England in regard to the Darien Scheme, excited and kept alive the bitter animosity of the poor, rude, turbulent nation against the richer, more cultured, and peaceful land; a Tory party, attached to the policy and sovereign of pre-revolution times, known as Jacobites; and a Whig party, who accepted and supported the Revolution Settlement. When Parliament met, Scotland recognised Anne as sovereign; and a measure was passed enabling her Majesty to appoint a commission to consider the propriety and advantage of uniting the ancient kingdoms of England and Scotland into one inseparable monarchy. Between 1702, when the commission met, and 1707, when the Union Bill was passed, the Earl of Haddington had a great deal to do in keeping the Union party together and in avoiding the conflicts of passion which, in antagonists so keenly opposed to one another as these were, might have jeopardized the best interests of both nations. His early sympathies were with the Cavalier party, and, indeed, in his nature and disposition there was a good deal of the love of rollick and frolic which distinguished the Royalists. His tastes lay in the direction of gaming and sport, raillery of opponents, and personal enjoyments for which the Cavaliers got credit. But he had accepted the Hanoverian family in good faith, and though, at first, he did not favour the measures proposed by the Government of Queen Anne, yet under the influence of his near neighbour and kinsman, Adam Cockburn, of Ormiston, Lord Justice Clerk of Scotland, his zeal for the good of his country was wisely awakened, and he became convinced that a Union on fair and equitable principles would operate to the best advantage of both countries. Being naturally hot-tempered and proud, and moved both by ambition and vanity, he had to endure a large amount of party hostility when he gave in his adherence to the English interest—as it was then called—along with the Marquis of Montrose, the Earl of Seafield, and others. But having taken up his position, he wrought honestly for the best good of his country, by securing the most favourable terms possible at the time and in the circumstance, and so far as regarded taunt or gibe, gave as good or as bad as he got.

In a very rare and valuable collection of "Tracts Relating to the Union between Scotland and Ireland," which were being examined for a different purpose, in the Advocate's Library, Edinburgh, we found a Broadside Song [No. 25] entitled "The Vision," a poem on the Union, of date 1706, attributed to the Earl of Haddington. It begins thus:—

"Come hither, ye dreamers of dreams,
  Ye soothsayers, wizards and witches,
That puzzles the world with hard names,
  And without any meaning make speeches;
    Here's an Earl in the North,
    Near Edinburgh's Firth,
Though little has been said of his name or his worth,
    Has seen such a vision," &c.

He then proceeds to set forth in satirical terms the National Church seeking disunion, and taking help in its delirium from the church which it pulled down, the mob cursing their poverty, the soldiery mourning that their trade would suffer; the country ladies lamenting the decay of the court and the city, and the merchantry opposing the attempt "To force the poor Scots their own trade to regard." It is a rough rhyme, evidently made to be sung and sold in the streets by "the flying stationers" of the time. Its humour is coarse, and its matter of little real worth, though dexterous lines here and there hit right to the centre of the anti-unionists' arguments. After having promoted the Union to a successful issue, it is not to be wondered at that he was one of the sixteen representative Scottish peers who were by election called to sit in the Imperial Parliament; and this honour was conferred on him thrice in succession.

After the Union Settlement, 1707, the Earl of Haddington resolved to show on his own estates that improvement was a possibility in Scotland. Judging from the account of the condition of agriculture at the close of the seventeenth century, transmitted to us in the "Treatise on the Affairs of Scotland," by Fletcher of Saltoun in 1698; and in the numerous writings of the acute and practical Henry Home (Lord Kames), the country was in great need of such a benefactor. The civil and religious conflicts and contests to which Scotland had been subject had brought the agricultural population to a most abject and miserable state. The people were benumbed with oppression, and enterprise was paralyzed among them. The tenantry were too poor to make any improvements—in fact they were seldom able to stock the farms they occupied. The landlords acted on no other principle than to force as much as possible from an unwilling and outworn soil every year. Tenants were disheartened. Farms were difficult to let, and, when let, difficult to wring a rent out of. There was no thought applied to the production of crops. Agriculture was not a science, but a set of traditions—one might almost say superstitions. Arboriculture, either as an industry, an art, or a science, was quite unknown.

One of the superstitions in regard to the culture of trees—that they could not grow on the sea-coast on account of the sea breeze—Lady Haddington had succeeded in disproving by the best of all evidence—the success of her plantations round the mansion of Tyninghame. His lordship, delighted at the results of this experimental planting, and eager, not only to improve and enrich his own estate, but to benefit his tenantry and to do good to his country, was tempted to enter upon a new, fresh, and well-thought-out plan for extending the timber-culture on his lands and bettering the arable products of his fields. He proceeded to enclose and shelter his cultivable ground by stripes of plantations; he separated his productive from his waste land, and while he did all he could to increase the yield of the former he resolved to try planting on the latter. In 1708 he introduced into his leases of arable land a provision for the use of fallows—and this was extensively practised on the earl's estate of Tyninghame for a long time before it was adopted in other places. There lay between the mansion-house and the sea-shore a large tract of rude and unproductive land, mainly sand, which was, in fact, little better than a rabbit warren. This he planted with firs, and in a short time had the satisfaction of seeing this wild, unsightly, and useless portion of his estate made wholesome and pleasant to the eye, by the production upon it of an excellent and valuable growth of fine timber. The project succeeded to perfection, and on the East Links there still flourish from water's edge to hill ridge top the successors of those daring plantings, at which wiseacres shook their heads and muttered ominous prophecies, but which the earl—fortified by the experience of Binning-wood,—went on with, for his own pleasure and to his own profit. Thus, under the skilful treatment and dauntless persistency of the Earl of Haddington—rightly carrying out the motto of his house—*præsto et persto* (I stand forth and persevere)—on lands where trees were almost unknown before, woods extending to 800 acres rose around, an ornament and blessing to the country, a pleasure to himself and a profit to his descendants.

Mr. McWilliam, in his useful, ingenious, and agreeable essay on the dry rot, and cultivation of forest trees, after giving a glimpse of the progress made in Arboriculture at Tyninghame, traces back the origin of the successful results to the countess in these words:—"Thus did her ladyship, to the honour of her sex, and the benefit of her lord and her country, overcome the prejudices of the sea and the barren moor being pernicious; and of horses and dogs being the best amusement for a nobleman; and convert a dashing son of Nimrod into an industrious planter; a thoughtless spendthrift into a frugal patriot," while he gallantly, if not very poetically, adds:

"Thus can good wives, when wise, in every station,
On man work miracles of reformation.
And were such wives more common, their husbands would endure it;
However great the malady, a loving wife can cure it.
And much their aid is wanted; we hope they'll see it fairish,
While barren ground, where wood should be, appears in every parish."

The Earl of Haddington not only continued his forestal experiments himself, but carefully inculcated his views concerning planting in the mind of his son, Lord Charles Binning (who became Solicitor-General for Scotland in 1721), after whose death at Naples at the early age of thirty-six, in 1732, he composed that series of letters on planting for the instruction of his grandson, the seventh earl, which form so excellent a memorial of his lordship's praiseworthy endeavours on behalf of forestry, and exhibit him to us in the light of an active and successful improver of his patrimonial possessions, and as a wise and kindly adviser. With the title of "A Treatise on Forest Trees" these letters were published in 1761, and had the effect of quickening and increasing the interest felt in forestry in Scotland at that time. The letters may be read with interest still by all who are concerned in the improvement of land and the culture of timber. So valuable and excellent have they been judged that in a publication on "Old and Remarkable Trees in Scotland," issued by the Highland and Agricultural Society of Scotland, 1867, the entire matter of this treatise is dispersedly reprinted, as it was thought, so the Introduction states, "that the views on such a subject, entertained by the Earl of Haddington, who created the Tyninghame Woods, and who was one of the most experienced planters of his day, will not be uninteresting."* On one point Lord Haddington insists strongly: that the *oak*, while one of the most valuable, is also one of the most easily raised of all trees. He says that the oak being his favourite, he had planted it on every soil, and that it grew to very good trees in all. "On poor land, or middling, on heathy or gravelly, on clayey or mossy, on spouty or rocky ground; nay, even on dead sand," he asserts that "the oak grows faster than any other species of tree, aquatics excepted."

By other writings than this "on Forest Trees," the name of the Earl of Haddington is reckoned to have earned a place on the list of

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* This work, which only came into my hands through the kindness of the librarian of the society in the middle of January, is, I may state, an exceedingly valuable and exhaustive record of what may be termed Historic Forestry.

"Royal and Noble Authors," but they redound much less to his credit. They bear the titles "Forty Select Poems," on several occasions, by the Right Hon. the Earl of Haddington, 1737, 1761, 1765, 1783. "Tales in Verse, for the Amusement of Leisure Hours," written by the ingenious Earl of Haddington, 1737, 1753, 1765, 1767, 1777. These were hasty productions of his hours of hilarity; they are neither destitute of wit nor fancy, but they are in their general tendency, as Pinkerton says, immodest and decidedly naughty. They were thrown off hurriedly, handed about in manuscript, collected together by somebody, and printed unauthorized, and in Edinburgh and in London they have since passed through many unacknowledged editions. They are such verses as Prior had made popular, and are notable chiefly for their witty, licentious levity.

Among the Tyninghame marvels of the Earl's planting, we ought, perhaps, to notice the famous holly hedges. These are of great size and extent. Some accounts state that they stretched along a length of 2,952 yds. One walk on the S.W. of the house, 743 yards long and 36 ft. wide, had on its borders holly hedges planted on a raised bank, 11 ft. wide at the base and 15 ft. high. On the east the holly rose to a height varying from 18 to 25 ft., while on the estate there were holly-trees from 6 to 8 ft. in girth, and from 46 to 54 ft. in height. Among the trees which the Earl experimented on as likely to become a considerable forest tree in Scotland, because it prospered on the sea-rocks of its native land, exposed at once to the blasts and the spray, and yet is not windwarped, was the Norway Maple. Of the success attendant on this experiment we have learned nothing more than that eighty years afterwards, at the entrance of the shrubbery a maple of this sort—a healthy, vigorous tree—7 ft. 3 in. in circumference, yielded ripe seeds every year.

Of the Father of Forestry we have little else to tell; but what remains to say is chiefly to his credit. On the breaking out of the Rebellion, in 1715, he took arms in support of the Government, and he, along with his brother, John Lesley, Earl of Rothes, and his son, Charles, Lord Binning, fought side by side against his old friend, the Earl of Mar, in the ranks of Argyle, at the indecisive battle of Sheriffmuir, 13th Nov., 1715. His presence there is mentioned in the Ballad of the Battle of Sheriffmuir, as having

> "Advanced on the right, man,
> While others took flight, being raw, man,"&c.

After Sir Robert Walpole became Prime Minister, and when he began to act on the principle that "every man has his price,"—so that venality, systematic and undisguised, became a part of the means of supporting the ministry, the Earl of Haddington, as one of a few who had the reputation of being above taking a bribe, withdrew from the

Court, and spent an honourable and useful retirement in the culture and improvement of his ancestral domains. In an anonymous ode entitled "The Faithful Few," published at Edinburgh, 1734, he is thus praised for his spirited independence:—

"Mild Haddington, whose breast's with learning fraught,
  Receive the tribute of unpurchased praise;
Thine is the honour to retire unbought,
  And persevere in Virtue's sacred ways;
Not less becomes the man the Muses love,
And all the friends of liberty approve."

In 1732 his lordship's son, Charles, Lord Binning, who had gone to Naples for the benefit of a change of climate, died, leaving behind him issue by Rachel, daughter and heiress of George Baillie, of Jerviswood—Thomas (then a boy of twelve, who became the seventh Earl), and three other sons. On Charles, Lord Binning, Hamilton of Bangour wrote an epitaph in verse, embalming his memory as an inheritor of patriotism and the power of verse. The Earl devoted himself sedulously to the education of his successor, and strove to train him to a knowledge of the rights and duties of a landowner. But only three years of life were allotted to him for this purpose, for the sixth Earl of Haddington died at the seat of Sir David Dalrymple, Lord Hailes, a little to the west of Fisherrow, near Musselburgh, in Oct., 1735, as noticed in *The Gentleman's Magazine* for that year, page 681.

As one who led the way in practical arboriculture, who earliest taught the worth and work of planting forest trees, who took the preliminary and adventurous steps in bringing into his native land the industry of timber-rearing, the Earl of Haddington deserves remembrance in the *Journal of Forestry*, and while we recognise with admiration his efforts in forestal pursuits, it would be unhandsome, ungallant, and ungrateful in the extreme to forget the happy, beneficial, and effective source of the woodland splendours of Tyninghame—Ellen Hope, Countess of Haddington.

## THE PITP-ROP TRADE.

The Newcastle-on-Tyne correspondent of the *Timber Trades Journal* says that pit-props have recently been brought so low as 2s. 6d. per 72 lineal ft., delivered from the ship, which can certainly leave very little for the exporters in Sweden and Norway.

From the same journal we gather that the quantity of pitwood imported into Cardiff during the year 1880 was 188,000 loads; to Newport (Mon.), 90,000 tons; to Swansea, 27,000 tons; to Leith, 8,500 loads; and to Bioness, 32,000 loads.

A heavy call for pit-props and mining timber throughout the season has been followed by a still heavier shipment, and as part of the latter has been on consignment, low prices have prevailed until the latter part of the year, when an improvement took place. Stocks are, however, still heavy at the coal ports, and as supplies are again likely to be on a liberal scale the probability is that coalowners will again get their supplies at a moderate rate.

## PLANTING WET MOORLAND.

Sir,—At page 580 of last month's number, "W. S. O." asks for advice on the draining and planting of wet moorland.

Open ditches 30 inches wide at top, 8 inches at bottom, and 18 inches in depth at 8 yards apart will suffice for soils of a peaty nature overlaying stiff clay. As such soils, when drained, subside considerably, it will perhaps be found necessary to deepen the drains two years after planting.

Larch will not thrive on such soils, and the undertaking your correspondent contemplates will be a greater success if he confines himself to Scotch fir, spruce, alder, and birch. The plants selected for such an elevated situation (1,000 ft. above sea level) should be from 3 to 4 years old (transplanted); the former age if the situation is very exposed. If he notches the plants in (which method I would recommend), the moss should be pared off the surface, just where the plant is to be slipped in, which can be done with one stroke of the spade before making the notch. Moss retains moisture like a sponge, and should on no account be left in contact with the young trees. The ditches should be open twelve or more months before planting; autumn being the best time for the latter operation. I have never adopted the plan of planting larch 6 ft. apart, nor do I think it would be advisable to plant in that way, unless the situation is well sheltered. Young larches would be I think more benefited by the shelter the one affords the other, when planted at 3½ or 4 ft. apart, than from the additional nourishment drawn from a 6 ft. root range.

*Llanelly, S. Wales, January* 5th, 1881. Angus MacIntosh.

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Sir,—Your correspondent "W. S. O.," in your January number, asks advice about planting wet moorland, but he does not inform us of the exposure of the ground he intends to plant, or if it lies flat or on an incline.

If "W. S. O." frees the land from stagnant water as he proposes to do, there seems to be a fair chance that the trees he names will succeed, and I would recommend him to add a few birch and black Italian poplar to his selection. He asks if larch is likely to do well in such a soil as he describes, but he need not expect it to succeed on a retentive subsoil, in which water stagnates.

Your correspondent "C.," however, in same number, page 580, informs us that "he has found larch to grow well for fifteen years on heavy clay land and be useful for many purposes at that age," but that "afterwards they begin to decline and become hollow at heart."

"W. S. O." likewise asks advice as to forming a plantation of larch on a suitable spot, by planting it 6 ft. apart instead of the usual distance; and there is much to say in favour of doing this. The saving in plants and labour is considerable, as the number of plants required at 6 ft. apart is only 1,210 per acre against 2,722 at 4 ft. and 4,840 at 3 ft. We must take into account, however, that the further the young trees are apart the more will they be exposed to injury from high winds, and that hares and rabbits if they get amongst them will leave fewer uninjured; but planting trees of any kind should never be attempted in any district where "ground game" are numerous until they are destroyed.

*January 20th*, 1881. W. B. S.

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SIR,—In regard to planting wet moorland, referred to at page 580 of last month's *Journal*, larch will not thrive in damp mossy soil, owing to the severity of frost in such situations. I would recommend that Black Italian poplar be planted instead of larch, especially on the outside of the plantation, and would add birch to the selection already made by "W. S. O." The open drains described should do very well, and the ground ought to be ready for planting in the spring of 1882.

I never plant larch closer than 6 ft. on any soil, but generally 12 ft. apart, the space filled up by other species.

*Hopetoun, January 28th*, 1881. JOHN MCLAREN.

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SIR,—Before giving advice on the above, "W. S. O." (page 580) would require to state, How far inland is the part proposed to plant? Now exposed to the prevailing winds of the district? and whether in Scotland, England or Ireland? One can then fairly judge (though inspection would be better) the best course to pursue.

*Murthly Castle, Perthshire.* D. F. MACKENZIE.

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## DISEASE OF THE LARCH AND THE SCOTTISH ARBORICULTURAL SOCIETY.

SIR,—It seems strange, to me at least, that so much is laid to the account of the Society for not finally settling all about the *cause*, *effect*, *prevention*, and *cure* of the disease of the larch. There are so many persons seemingly under this impression that I shall only refer to their complaints generally but to no one in particular. These parties seem to think that this case is very easily disposed of.

Their "sayings" are tantamount to asserting that the Society is unable to grasp the matter with sufficient intelligence to be able to lay the matter plainly before its members, or at all events before the few who show from time to time that they are dissatisfied with its teachings. This may be true or it may not, but I hold that *each individual member* is responsible for any matter of importance not being fully gone into, either in the competitions or by discussions. It has been hinted that some intelligent foresters hesitate to give their opinion for fear of breaking down. I sympathize with all such, but there is a way for these frail brethren, and those of them who are members cannot fail to know it. Those who cannot stand up and recite their experiences (and there are many clever men with large experience who can scarcely speak a single sentence in public) should write whatever they have got to communicate, or any question they may wish to ask, and hand it to the Secretary, either at or before the meeting, and they will find that it will be attended to to their satisfaction, and perhaps often to the edification of their fellow-members. It is a pity that so very few enter into the discussion on important matters when they find that the subject discussed has not justice done to it; their very silence means that they consent to the matter as a whole, and it is only a few weeks or months after the debate that their heads are cool enough to consider that what has been done has not been accomplished as they consider right, or as it might have been done. This appears to have happened several times lately.

So far as the parties refer to the disease of the larch, I think that before cutting and carving at the opinions of others who are pleased to give them, they should by all possible means give us theirs, and let us judge between them so far as we are able. The short hints and snatches they generally give by way of interrogation are not sufficient proof of their ability to criticise the straightforward and frankly-given opinions of men of thought and experience. Instead of that course it would be really much more useful to us all that *each* should give his experience, how, and under what circumstances he acquired such, and as far as possible exhaust the subject in hand, and try, if possible, to prove the theory set forth. By doing this the diseases of the larch and other important matters would get the attention they deserve. After a person writes his experience he can wait patiently till some other person proves, or tries to prove, his theory to be wrong; when this is done, he gets an opportunity to prove for himself, whether or not his critic is sound in his theory, by which both they and the onlookers will be much benefited. We may not agree with many of the theories and opinions of other people, but it is only common courtesy that we let them alone unless we can show where they are wrong and how they are so, but even then we should criticise courteously, especially when men give us their views candidly and for our benefit.

The disease of the larch is too important a matter to be allowed to lie on the table, as it were, and is above mere superficial inquiry. Those who have not yet well begun the study will find before them years of careful and laborious study, if they examine into all the particulars for themselves.

*Murthly Castle, Perthshire.* D. F. Mackenzie.

## ARBORICULTURAL COMPETITIONS.

Sir,—In reply to "E. H. N." (page 586), I think he ought to write to Mr. McLaren, the Secretary of the Society, asking him to lay the matter before the Council at their next meeting.

Things would soon, I fear, come to a standstill if writers were allowed to retain, if they choose, their incognito. As regards reporting on plantations (No. XIV.) I should consider it quite proper, provided the writer gave his full name and address to the Secretary; so as that the plantations might be seen if it was thought necessary to inspect them. When dealing with other people's property without leave it would not be desirable to allow writers to preserve their *nom de plume.*

There are some, but it is to be hoped very few, proprietors who would deter their servants from writing essays on such subjects; besides, the servant has his own leisure time for writing, and no master would think of calling him in question except perhaps for reporting on his woods, and property. A good many might be displeased, and their consent should certainly be asked.

*Murthly Castle, Perthshire.* D. F. MACKENZIE.

## THINNING PLANTATIONS.

SIR,—The merest novice is aware that a method of thinning plantations is to take out one tree and leave room for another to develop itself. And any man who has had even a little experience will select for removal an unhealthy one (if it is there) in preference to a sound one. Indeed, Mr. George E. Brown in the last issue of the *Journal* was perfectly correct when he stated as his opinion that it is better to take out a bad tree. Few foresters will doubt the wisdom of such practical advice. It was to be wished, however, that Mr. Brown would have left aside all his hoping, trusting and presuming about other perplexed opinions, and grappled his subject with the view of treating it on practical £ s. d. principles. In his last and long-looked-for contribution he deals with the subject-matter under discussion in rather a haphazard manner. He says nothing on the subject of thinning where soil and situation are not suitable for long-lived timber; he is also mute where there is a tendency to heart-rot, and he is further silent on the subject of felling his permanent crop. Now, it strikes me the practical forester studies all these points and conducts thinning accordingly. We are told by Mr. Brown that he thinned a young plantation in Ireland which was before he began it simply disgraceful, and even after being thinned he says it never will be a good crop because it was not thinned before it was fifteen years of age. Until Mr. Brown is able to lay before us some facts and figures in proof of his method, we, in Ireland at least, must adopt his suggestions and accept his ideas regarding the thinning of young plantations for what they are worth.

*Cahir Estate, County Tipperary.* WM. HARROWER.

## ARAUCARIA AT PORTGLENONE HOUSE, CO. ANTRIM, IRELAND.

SIR,—I send you the dimensions of an *Araucaria imbricata* which I measured the other day, growing in the grounds of R. J. Alexander, Esq., D.L., Portglenone House, co. Antrim. Circumference at 1ft. from the ground 7ft. 6in.; at 5 ft., 6 ft. 1 in. Height 40 ft. This tree is growing in an exposed situation, upon light, sandy soil; it was planted about thirty years ago. It was bought as a small plant in Bagshot Nursery, Surrey, by Mr. Alexander's grandfather.

I am of opinion that this tree would compare favourably with the splendid specimen at Woodstock, co. Kilkenny. The one at Woodstock grows in a sheltered situation.

*January 22nd*, 1881. G. K. DODDS, *Forester.*

## EFFECTS OF THE GALE IN SUFFOLK.

SIR,—No doubt you will have some reports to hand respecting the recent gale on Tuesday, the 18th Jan. which swept across the greater part of the kingdom, and doing great damage to all kinds of property both on sea and land. Perhaps it would not be out of place to give a short account of the damage done to woods and plantations along the east coast. On the Sudbourne Hall Estate, the property of Sir Richard Wallace, Bart., K.C.B., M.P., the damage done is considerable. Many grand old trees of great beauty were brought to the ground, carrying with them many other fine trees, which could ill be spared. Noticeable amongst those were several beautiful limes, standing in an avenue directly opposite the north front entrance, and looking towards the high road leading to Woodbridge Wickham Market. Some of those trees were of large dimensions, having upwards of 200 cubic feet of timber in them. This avenue was only opened up two years ago, and was considered by its owner to be a great improvement, but, alas, much of its beauty is gone through the fury of the wind. Near to these limes there are standing two fine old beeches, bearing dates of various periods, one in particular being 1781, exactly a century ago, and which is still quite distinct. If this is any criterion these limes must have been fine trees a century ago. There are also several large oak, ash, sycamore, beech, &c., levelled with the ground; but the greatest havoc has taken place amongst the Scotch firs and spruce. In one plantation, of not more than six acres in extent, there is nearly a hundred of its occupants gone, principally Scotch firs. Strange to say there are very few elms uprooted, and not more than four or five ash. Altogether there are about 300 large trees uprooted. One promising young *Wellingtonia gigantea*, about 14 ft. high, was smashed to pieces by the falling of a spruce, leaving about 2½ ft. of a stump standing as a memento of the past. On the estate of the Right Hon. Lord Rendlesham, M.P., Rendlesham Hall, near Woodbridge, the damage is very considerable, some fine old spruce and Scotch firs being uprooted. On the outer and more exposed portions of the estate the damage is much more extensive than near the mansion, where the trees are better sheltered. On the estate of Colonel Tomlins, Orwell Park, near Ipswich, there is much damage done. Some very fine elm, beech, poplar, Scotch firs, and spruce; also a splendid cedar of Lebanon, the dimensions of which are as follows:—length of bole, 47 ft.; girth at 23 ft. 6 in. from the base, 5 ft. Allowing 1 in. for bark, this will give something

like 64 cubic ft. as the contents of the bole. The number of trees uprooted on that estate will reach quite 200. I shall not further trespass on your space at present, as I may find something else of interest to report respecting this great gale.
J. W.

## WOODS AND THEIR MANAGEMENT

SIR,—Being pleased with the sensible and unpretending remarks of Mr. Brown, as penned in last month's *Journal*, at page 573, I cannot refrain from corroborating the evidence given, and thoroughly concur in his remarks on "thinning" young plantations. I have read the various articles that have been written from the commencement of this *Journal*, and have noticed the bold attempts to explain and lay down rules for thinning, but must conclude from what I have seen written and my own experience, that it is simply impracticable to give sufficient justice to so vast a subject within such a small compass as has been hitherto aimed at.

Thinning, to my mind, comes within the range of a "profession," and like all others cannot be attained at one bound, neither can it be thoroughly understood from theory, so that if there should be any Mrs. "Sea Greens" existing now I would advise him to lay his book aside, and visit a neighbouring estate, where a practical forester has been kept for upwards of twenty years, and he will learn more walking through his woods with him in one day than a twelve month's searching in books, for unless he is endowed with a certain amount of practical experience, what he reads will only have a tendency to mislead him in practice.

Again, my conclusion in regard to thinning is this, that those who say, "Why thin at all; and why cannot a safe rule be laid and safely followed by the inexperienced?" know little or nothing at all about forestry, and speak foolishly.

I have seen plantations ruined from want of thinning, and have seen them ruined from over and unskilful thinning, so that I am convinced they are both alike ruinous; and whoever is satisfied to go by the name of "Sea Green," and allow his plantations to be injured by either of these causes, betrays more skill in choosing names than in managing of woodlands; it is also a fact that a great many of our landed proprietors are content to leave the thinning of their woods to the workmen on the estate, whilst the Agent supervises and disposes of the produce.

There are, however, exceptions to this rule, and occasionally we find when the estate is too small to keep a forester, a practical man is sought for on such occasions, and the result soon becomes apparent both in profits and the general appearance of the estate.

Whilst passing through an estate lately, I observed a plantation of Scotch fir, about ten years' growth, pruned up to within 4 ft. from top. They varied from 2 to 5 ft. apart. Will any of your readers give their opinion upon such treatment? My opinion was asked, and I at once condemned it. Was I right?

W. W.

## ANSWERS.

74. **Specimen Trees.**—In reply to "H. M.," in the December number of the *Journal*, the largest *Pinus laricio* here measures 8 ft. 6 in. in circumference at 4 ft. up, and 69 ft. in height. Though a finer specimen than the one mentioned by Mr. McLaren as growing at Hopetoun, yet I by no means affirm it to be the largest in Britain.—**Angus D. Webster**, Penrhyn Castle, North Wales, January, 1881.

75. **Inarching.**—My remark under this head, when writing of the chestnut, would have been more correct if I had said—"In France varieties are *continued* by inarching." Miller says of the method—"Inarching is a method of grafting which is commonly called grafting by approach. This method is used when the stock intended to graft on, and the tree from which the graft is to be taken stand so near, or can be brought so near that they may be joined together. The manner of performing it is this: take the branch you would inarch, and having fitted it to that part of the stock where you intend to join it, pare away the rind and wood on one side about three inches in length. After the same manner cut the stock or branch in the place where the graft is to be united, so that the rind of both may join equally together, at least on one side, that the sap may meet; then cut a little tongue upwards in the graft, and make a notch or slit in the stock downwards to admit it, so that when they are joined the tongues will prevent their slipping, and the graft will more closely unite with the stock. Having thus placed them exactly together, tie them with bass or other soft bandage, then cover the place with grafting clay to prevent the air from drying the wound, or the wet from rotting the stock. Fix a stake in the ground, to which the stock or branch and graft should be fastened to prevent the wind from separating them."—A. J. B.

## ENGLAND.

The complete suspension of planting operations in consequence of the severity of the weather will make it all the more necessary to enter upon it with increased energy when the state of the land will permit of the work being resumed. Late removed evergreens, especially those of large size, should receive some kind of protection wherever it is possible to afford them such. Magnolias also, and the Pampas grass, except in very well-sheltered spots, should be well covered up.

Now that the falling of underwood either is, or should be, stopped by the frost, all thinnings of mixed hardwood plantations should at once be cut down and removed. The severe frosts have afforded excellent opportunities for carting from plantations upon the wetter soils of the country, when winter work is generally very heavy. Poplar, willow, birch, ash, and sweet chestnut should at once be felled and carted out. And while planting is stopped, all oaks for spring falling may be marked and allotted.

The present low prices of hop-poles should induce growers to leave upon the stub some of the best-grown and most promising standards, to come in as strong use and fence-poles at the time of the next fall. These interfere very little with the adjoining growths, and afterwards afford a good supply of large-sized poles which are but seldom attainable where regular rotations of close cutting are carried out.

The past month has afforded excellent opportunities for getting manures and composts upon nursery grounds. These should be spread and worked in as soon as possible, and the land afterwards rough dug in preparation for smaller transplants, layers of elm and lime which have been severed from the stools, and for making new layers. Towards the end of the month, if weather will permit, sow the remaining elm seeds, and also sycamore, maple, ash, and beech. Osier beds may also be planted before the end of the month. Choose clean and fertile land in such situations that the water can be admitted or run off at pleasure. No crop pays better for good and clean cultivation. Acorns, walnuts, and chestnuts may still be planted.

New hawthorn hedges should be at once completed. As this plant comes early into leaf it requires to be well established before spring arrives. It requires a tolerably good soil to bring it to perfection as a hedge plant; and where the soil is very poor the beech or the myrobella may grow more freely.

As stated in a former article, upon wet land useful hedges may be formed of two-year-old plants of birch and alder placed upon raised mounds, or from the cuttings of alder, willow, and poplar. The former plants may be used without cutting them back; and the latter may be shoots of the previous year, about 15 in. in length.

In all beds of seedlings allow sufficient room for cultivation and thorough cleaning; from 18 to 24 in. by 5 in. for hardwoods, when these are expected to stand two or three years; and larch and Scotch from 15 to 18 in. by 3 or 4 in. Strong seedling larch may be notched in at the end of the first year; but where the plants are weak they require two years' nursing.

Osiers may now be cut for the cooper and the basket-maker. The latter are prepared for peeling by standing them in shallow water. Cuttings of alder from the last year's shoots may now be made and put in, allowing one pair of eyes or buds below the surface and another pair above. The poplar cuttings should be taken from the lower or thicker end of last year's shoots. Both these kinds flourish most in a soil rich and light. Willow cuttings for the nursery should be about 9 in. long and from the firmest wood of last year's shoot. Two inches left above the surface of the ground is generally considered sufficient.

*Pluckley, Kent.* A. J. Burrows.

## SCOTLAND.

The severe weather and snowstorm of last month have retarded all kinds of forest work to a great degree.

Whenever the weather is favourable spring planting should now be commenced, and pushed forward with despatch. Young plants will be found most suitable in general for planting in the northern part of our island, say three years old, and they will answer the purpose on exposed tracts all the better if transplanted every year in the nursery previously. It is of great importance in planting on exposed districts to take in a sufficient breadth so as to ensure some shelter for the trees themselves. If practicable, a good plan is to plant in blocks or large clumps. The trees are thus a protection to each other, the timber being consequently much better than if planted in straggling narrow strips, which are often not suited for our severe climate and uneven country. When large areas are planted a touch of the ornamental can sometimes be given with good effect. Groups of trees of different shades may be planted here and there as the ground will suit; the various tints at certain seasons are often very pleasing. A good effect can also be produced if the plantation is seen against the horizon by interspersing some tall-growing trees—such as silver or spruce fir, which will give a rugged and picturesque appearance when seen against the skyline.

W. W. R.

## IRELAND.

A MONTH of an unbroken storm of frost and snow is an unusual occurrence in Ireland. Since New Year's Day the weather has been unequalled in severity for the past twenty years. From the fact that the frost, which has been most intense, came quite unexpectedly, it is feared that many valuable and rare plants have perished. During the storm of last month all outdoor work had to be suspended, incurring considerable arrears of forest-planting. Anticipating fine weather for the rest of the spring, much may still be done in the way of planting, and no time should now be lost in having general planting of forest trees finished.

The nursery will claim the undivided attention of the forester who has much planting on hand. He must embrace every opportunity and get his seedlings all in, if possible, by the end of the month. When planting give plenty of room between the rows to admit of hoeing, and from 3 to 6 in. between each plant. Where strong, healthy plants are wanted, avoid by all means the overcrowding of the public nursery.

Transplanting can be successfully performed this month, and if the weather is dry use plenty of water thrown in over the earth about the roots. The great advantage of watering when transplanting seems not so well known as it ought to be. If when moving trees or shrubs—at any season—the earth was only loosely returned to the hole until nearly filled and then an ample supply of water poured in until the earth is even a puddle, it finds its way in and around every cavity below or about the roots, and when properly done there is seldom a failure of the plant growing. Should powdered charcoal be mixed with the water the success is all the more certain. As it is better to have a portion of the nursery under green crop every year, such places intended for that purpose ought to be prepared and cleaned.

Sow thorn, ash, sycamore, &c., during fine weather, in prepared beds. Also thoroughly clean seed-bed for the smaller seeds of coniferæ. Finish cutting and splashing hedges this month, and, if possible, also the planting of them. Thinning game coverts may still be carried on, also felling timber.

So intense was the late storm in Ireland, that rooks, curlews, and wild birds were actually coming into our dwelling-house. Several visited me one day while at dinner, and on throwing them some crumbs they would only retire as far as the hall-door and return for more. Starlings, robins, blackbirds and thrushes were dying in dozens.

*Ballinacourte, Tipperary.* D. Sym Scott.

## WALES.

The heavy fall of snow and severe frost during a great part of the past month put a stop to a good deal of out-door labour. Much time has been spent in sweeping walks and drives, and removing snow drifts, removing snow from specimen trees and shrubs. In many places the snow was drifted to a considerable depth, impeding traffic; where there are heavy cuttings of snow it is better to throw as much as possible to the under or lower side of drives or walks; so that it may run from, and not on the road when it thaws. All work in connection with planting or preparing for the same has been out of the question. The falling of timber and thinning of plantations has been the principal occupation of the woodmen during the month, which may be continued during the present month. Continue the removal of timber while the frost holds. With a favourable change, and as soon as the ground becomes dry and firm, planting operations will have to be resumed, and pushed forward as fast as possible, as the season will be getting short.

Bind up faggots, prepare firewood, &c., as last month.

*Kinmel Park.* Lewis Bayne.

Prices of British Timber.—A correspondent writes to the editor of the *Timber Trades Journal* as follows:—"I wish you could give more attention to the prices current in the principal markets of England and Scotland for home wood goods, such as pitwood, fir and larch, sleepers, railway fencing post and rails, and sleepers (larch and fir), coach, cart, and waggon wood, such as poles, spokes, felloes,&c., as also the prices for good sound oak, ash, elm, beech, sycamore, and lime trees, &c., in the round at the principal towns of England. Of course I know it is very difficult to ascertain prices current in the home wood trade, but I think if you were to ascertain and publish the current rates it might tend to greater uniformity in prices, and do away, in part at least, with the present ruinous competition." [The difficulties in the way of obtaining accurate information as to the prices of home-grown timber are very great. We do all we can, but we wish some of our readers who are in the midst of this trade would assist us more.—Ed.] Another correspondent writes:—"I note on page 13 of your last edition, you draw attention to the quantity of English timber sales, concluding that the trade for these goods has improved. To my mind it points in the other direction, viz., that tenants insist upon having timber cut on the lands, and also that owners who cannot get the prices they have been accustomed to are cutting timber to make up this deficiency, thus forcing stuff on the market and putting prices down."

# THE HOME FARM.

## OPERATIONS FOR JANUARY.

*(Omitted from last month's issue.)*

*Arable Land* should be all ploughed, in readiness for spring crops, before the end of the month, and upon wet soils good open water-furrows should be drawn with the plough to keep the surface as dry as possible. All ditches into which the drains empty should be kept well scoured, and ash, willow, elm, and other trees, whose roots penetrate and afterwards choke up the drains, should be felled. Manures may be carted on the land and ploughed in for mangolds, tares, spring cabbage, kale, carrots, potatoes, and other early crops, wherever the soil is not so open as to admit of these sinking too deeply before the crop is put in. Continue to plough close up to the sheepfolds upon turnip lands. Winter peas may be put in close behind the plough, and wheat by the end of the month.

*Drainage* should be pushed forward rapidly. Proportion the depths of drains to the nature of the land. The adherence to one uniform depth for soils of different degrees of retentiveness is the cause of the inefficiency or complete failure of much of the drainage which has been done in various parts of the country. Upon the stiff clays of the Weald of Kent drains 3 ft. deep and 18 ft. apart have been found to answer admirably, while upon the heaviest Norfolk clays even a less depth has produced the best results. One cause of the partial failure of deep drainage upon heavy soils is, that as the depths have increased the intervals have also been extended, to equalize the expenditure per acre, whereas the stiffest soils require the smallest intervals.

*Hops.*—Manures being carted on and spread, dead hills planted up, shoddy or other bulky and slow decomposing materials applied, and all new poles carried on and stacked, proceed with the ploughing or digging. The hills will be all the healthier for being opened early and exposed to a moderate amount of frost and drying wind, even if they make a somewhat later start in the spring.

*Live Stock.*—The horses will now be regularly employed in carting upon the land and ploughing during dry and frosty weather, hauling manure to clamps in the fields for summer crops, and dragging and rolling the drier pastures. When driven off the land, lay in lime, salt, artificial manures, and cake, and deliver corn to market.

The fatting bullocks should have an increased allowance of cake. As they approach maturity the quality of the food should be improved. A mixture of flesh-forming and fat-producing food should be given. Among the former are beans, peas, and lentils; and among the latter, crushed linseed and linseed cake and barley, &c. Eight lbs. of bean meal or 6 lbs. of linseed will each produce 1 lb. of live weight; but the 14 lbs. of the mixture given together will yield 4 lbs. of increase instead of 2 lbs. Draft out ripe cattle for market and fill their stalls from the yards. Keep all feeding stock clean and well bedded, and apply mercurial ointment, soft-soap, or train oil where their coats harbour vermin.

Ewes should now be liberally fed, without having too great an allowance of turnips. A few of these, drawn and carted to the driest pastures, will be better for them than a larger quantity fed off upon wet arable land. Besides, the plan of closely folding ewes in lamb is highly objectionable; their health requires a fair amount of exercise daily. To ensure the continuous progress of fatting sheep they should have regular feeding, plenty of dry food, and clean troughs. Access to running water is far preferable to allowing them to drink from stagnant pools.

*Meadows* intended for mowing should be cleared of stock by the end of the month, and where top-dressings have been applied these should now be brushed in, after which the heavy roller may follow. Irrigation should be continued as during last month, constant attention being given to hatches and watercourses.

*Manures* previously carted out may now receive a turning in the fields. Chalk, limeshells, and old mortar add greatly to the value of a compost containing some fermenting manures. Cart out the contents of liquid-manure tanks, after stirring up some gypsum in them, and saturate the heaps. The liquid manure is especially valuable with fine bones or ashes.

*Poultry.*—House warmly, to secure early laying. Give a little buckwheat at first, and afterwards some whole maize. Turkeys should be out in fine weather only. Give geese some damp food and a supply of greenstuff from the garden.

*Estate Work.*—Ample work will be found for the horses, whenever they are not employed upon the land, in clearing the falls of timber and underwood and filling the timber yard and wood sheds, carting faggots for lime-burning, and laying in other materials.

B.

## OPERATIONS FOR FEBRUARY.

*Arable Land.*—Ploughing being now finished, advantage should be taken of all open weather to get in corn crops. *Wheat* sowing should be finished at once, except where either the Talavera or bearded April wheats are relied on for late planting. *Peas* of hardy sorts may be sown early in the month, and almost any kind towards the end. About three bushels to the acre will be sufficient. The lighter loams and calcareous soils are especially adapted to this crop. Land for peas requires to be in good heart, and the drilling should be carried out without poaching. Where the brake is to be used, the rows should not be less than from 16 to 18 in. apart; but for clean land 8 or 9 in., with hand-hoeing, will suffice. This crop, though somewhat uncertain, is valuable alike for its corn and its haulm. By early planting peas may be harvested in July, and followed by turnips, rape, or mustard. *Oats* should be got in the ground as early as possible this month. They may follow mangolds carted off or turnips fed upon the land. The intervals between the rows should be wider than for wheat, and not less than 9 or 10 in.; for, unless the sunshine can act upon the stem to carbonize and harden it, the crop is apt to become lodged. The Tartarean oat is very suitable for planting in February, and it produces abundantly both in corn and straw. *Beans* should now be drilled upon a well-manured autumn or winter-ploughed furrow. If in rows from 20 to 24 in. apart, this may be made a fallow crop. A good stiff or clayey loam is best adapted. From 2½ to 3 bushels per acre of the smaller sorts is a good seeding. Beans require a firm seed-bed, and, where the land is dry and loose at the time of drilling, it should be consolidated by extra treading. Dibbling beans effects a considerable saving of seed, but this work is now but seldom well done on a large scale, where close supervision is difficult. Calcareous clays are well adapted to beans. The common horse-bean and the tick-bean are suitable for lands in moderate condition, and the longpod and Mazagan require land in a high state of cultivation. *Parsnips* may be sown upon good loamy land any time after the middle of the month, the furrow having been deeply ploughed early in the winter. From 5 to 6 lbs. of seed should be drilled and well harrowed in upon land previously rolled down. The rows should be not less than a foot apart. If drilled now the plants will appear by the beginning of April.

*Live Stock.*—Horses will now be fully employed, during the dry weather, in getting in the corn crops, or in getting on manure and giving a second ploughing to land intended for root-crops. It is an excellent practice, upon heavy soils, to plough in the dung for mangolds at this season. Feeding cattle will be treated as last month.

Where the lambing season is an early one, every preparation should now be made, by means of thatched hurdles and lews, to afford proper shelter. Dry food should be liberally supplied. The greater the warmth afforded the less food will be required. Such fatting sheep as are intended to be shorn and handed over to the butcher in May should now be well supplied with cut swedes, and have an allowance of between 2 and 3 lbs. of peas, oats, and oilcake per day. Pigs have hitherto been omitted from the calendar, our practice being to breed from the sows twice every year, and feed out at from four to five score weights all the year round. This system is a paying one, but it may possibly be surpassed in profit by marketing at six or seven weeks old. Pigs of large size should be sold, or killed and cured while the weather is cold. Warm food and frequent serving will be found a great help to small pigs.

*Hops.*—Proceed with the ploughing or digging, and finish up planting. Cut off and burn up the old bines, and thus destroy the destructive beetles (*Haltica nemorum*) concealed in them, and awaiting the advent of warm weather to bring them out.

*Orchards* may still be pruned or planted and manured. The "must" from the cider press may be used with advantage; but a good rich compost is the most valuable application. Remove moss from the stems, and prepare grafting clay by mixing with it some cow-dung and fine hay.

*Meadows.*—Continue the dragging and rolling of pastures, and keep the water alternately on and off irrigated meadows, as before. Stock of all kinds should, as much as possible, be kept off the wet pastures.

*Road-making* may be carried on throughout the winter as other work permits. Good drainage, a firm bottom, finely-broken stone upon the surface, and a slight inclination towards the water-table, are the main requisites.

*Poultry.*—Hens will begin to lay, and where the eggs are required to be kept, this may be done in vessels filled with bran or dry sand. Turkeys well housed and fed may be expected to lay now. Set geese as soon as sufficient eggs can be obtained.

*Dairy.*—Give good shelter and abundant food to cows as they calve down. At the end of a few days, or at the most a week, calves may be taken from the cows and fed from the pail. Milk will churn quickly at a temperature of 65°, and cream at 54°. B.

**Results of Tenders.**—Leicester.—Trees in Abbey Park:—Messrs. Barron and Son to supply, plant, and renew failures for twelve months (a total of 20,762 plants) for £2,250.

*Peruvian Bark.* By Clements R. Markham, C.E., F.S.A. London: John Murray, Albemarle-street, 1880.

In his volume on *Chinchona*, Mr. Clements Markham has given us, not only a popular account of its introduction into British India, as modestly stated on the title page, but a most interesting and instructive history of the "*Jesuit's Bark*," from the earliest dates at which it became known as a febrifuge up to the present day, together with much useful information regarding the Coca plant (*Erythoxylon Coca*) Caoutchouc (*Hevea*, *Cartiloa*, and *Ficus elastica*), Peruvian cotton (*gossypium*), cuzco, maize and quinua, and their adaptability for cultivation in different parts of British India.

The arrangement of Mr. Markham's work is excellent, and we commend his "Analytical Index" to all authors as a pattern, forming a compendium of the contents and facilitating ready reference.

Commencing with an outline of the work, the author refers briefly to the knowledge of the febrifuge among the Indians prior to the cure of the Countess of Chinchon, wife of the Viceroy of Peru, in whose memory he pleads for the retention of the correct spelling of the tree *Chinchona*, not *Cinchona* or *Cinhona*, in which we cordially concur. Then follows a chapter on the discovery and description of the trees by a French expedition to South America in 1735, the classification of the several species by Dr. Weddell in 1849 and 1870, and two chapters on the barks and their febrifuge alkaloids.

After some remarks on the rapid destruction of the Chinchona trees in South America and the importance of introducing and acclimatizing them elsewhere, Mr. Markham gives us a full account of his travels, the countries which he visited, and perils and hardships he and his assistants underwent in their expeditions with the above object.

Mr. Markham was entrusted with the work of introducing chinchona cultivation into British India in 1859, and left England for that purpose in December of that year. The objects of his mission, as stated at page 96, were "(1) the introduction into India of *all* chinchona species known to commerce; (2) the establishment of Government plantations wherever suitable sites could be found in India, to form centres for the distribution of plants and seeds, and for ascertaining the best methods of cultivation; (3) the manufacture in India of a form of the febrifuge, combining efficacy and cheapness."

He was assisted by Messrs. Weir, Spruce, Pritchett, and Cross, to whose abours and those of Mr. Ledger, who zealously co-operated for the same end, the author pays a well-merited tribute of praise, with expressions of regret that their recompense has not been adequate. Exception has, we believe, been taken in some quarters to this portion of Mr. Markham's valuable volume, but we confess we cannot share it. Were Mr. Markham still a Government servant, or seeking for preference or promotion under Government, it might have been *inexpedient* to criticise as he does; and did he complain of his own treatment by his employers his doing so might be deemed out of place and unseemly; but he has long ceased to be a Government servant, and we find no mention of himself in his chapter on "The Introduction of Chinchona Cultivation into India." Writing as an independent author, and feeling deeply that his colleagues had not received that consideration at the hands of Government which they might reasonably have expected, and to which the magnificent success of their labours fairly entitled them, Mr. Markham's criticisms appear to us both natural and apposite, and we trust it is even now not too late for Government to make amends.

After describing in Part II. the process of the transmission of the plants from South America to India, Mr. Markham devotes Part III. to "Chinchona Cultivation in India." Commencing with a chapter on the selection of the first site, he gives us a glowing description of the Nilgiri hills, in the Madras Presidency, where "the warmth is not heat, and the coolness is not cold," which makes our lips water as we write in the present inclement weather, leads us with him to his second visit there, in 1866, describing the progress which he found had been made meanwhile under the able superintendence of the late Mr. McIvor, "the ablest arboriculturist in India," and the splendid results obtained, whether viewed as a triumph of science, a financial success, or a boon to the fever-stricken masses of India. The Nilgiri chinchona plantations now cover 848 acres, containing, by recent careful enumeration, 570,000 trees, chiefly Red bark (*C. succirubra*) and Crown bark (*C. officinalis*). Their total cost since the commencement, in 1862, up to 1880, is stated to have been £160,000, including interest, whilst the receipts from the sale of bark seeds, &c., are given as £173,000! "Thus the whole capital charge, including interest, has been paid off, and all net receipts from this year are clear profit." The plantations would appear not to have sufficient attention since Mr. McIvor's death, in 1876, and Mr. Markham urges the need of a "scientific superintendent" to work out the problems which remain to be solved, *e.g.*, hybridization, acclimatization at lower altitudes, &c. Since he wrote we learn that they have been transferred to the charge of the Forest Department, which appears a step in the right direction. Besides numerous private plantations on the Nilgiris, experimental planting, more or less successful, has been carried on in the Wainâd, Coorg, and the Shervaroy, Palni, and Tinnevelly mountains, in the Madras Presidency.

Contrary to Mr. Markham's advice, a Government plantation appears to have been started at Mahabaleshwar, in the Bombay Presidency, which proved unsuccessful, and was finally abandoned in 1875, after £6,400 had been spent on it.

Upwards of 2,000 acres have been planted in British Sikkim, from which the bark harvest in 1878 amounted close on 350,000 lbs., "obtained by uprooting, coppicing, and thinning."

The financial results of these large plantations are not given, but it is stated that their main interest consists in "the manufacture there of a cheap chinchona febrifuge for the use of the people." Opinions differ as to the therapeutic value of this febrifuge; and if we mistake not, a committee of experts in Madras recently demonstrated very clearly that it was really much more costly than had been assumed, and uncertain in its results. The manufacture of a cheap and efficacious febrifuge on the spot is a more important object which should be steadily kept in view, but so far it would appear preferable to ship the bark to England and purchase our supplies of quinine and the other alkaloids in the open market. This is especially the case with regard to the more valuable descriptions of bark grown on the Nilgiris, which command the highest prices in the market; some renewed *officinalis* bark having realized as much as 15s. 8d. per lb. The East Indian source of supply is now the most important next to Colombia, the former having been 6,000,000 lbs., and the latter (including Ceylon), 1,172,000 lbs. in 1879-80. Great strides have recently been made in chinchona cultivation in Ceylon, where it is stated that 5,578 acres were under cultivation in 1877. "The entire cultivation is carried on by private companies and private proprietors; Government having so far only given its attention to the propagation, nursing, and classification of the plants. *Succirubra* is the variety in favour, the variety in demand, the variety that pays, and the variety that thrives, it requiring little attention in propagation and costing next to nothing to rear." (*Mr. Macmillan before the Pharmaceutical Society in April,* 1878.) Good results have also been obtained in Java, where the Dutch initiated chinchona plantations under Government management as early as 1858. Their first experiments were not successful, mainly owing to the poor quality of the species first introduced, *C. ovata,* subsequently named *C. Pahudiana.* Great attention has since been paid to the cultivation and introduction of new species, notably *C. Calisaya, var. Ledgeriana,* which promises to take rank amongst the most valuable and richest barks. The Java plantations in 1879 contained 1,678,670 trees, which yielded in that year 106,000 lbs. (Amst.) of bark.

We shall not follow Mr. Markham further, but can confidently recommend his volume to our readers as one which will repay perusal. The work closes with a copious "Bibliography of the Chinchona Genus," which will certainly take a high place in all future treatises on the subject.

*The Gardens of the Sun; a Naturalist's Journal in the Mountains and in the Forests and Swamps of Borneo and the Sulu Archipelago."* By F. W. **Burbidge**, Trinity College Botanical Gardens, Dublin. London: John Murray, Albemarle Street.

The large Archipelago upon which the Arabs who passed the Golden Chersonese bestowed the name of the "Twelve Thousand Islands," possesses more than an ordinary interest for Englishmen, on account of the part taken by Rajah Brooke in organizing amongst its partially civilized tribes a system of government which did much to put an end to the barbarous head hunting then prevalent, and encouraged habits of industry where listlessness and sloth had formerly ruled supreme. The Dutch in the southern parts of the island of Borneo in those days, as in the Transvaal more recently, pursued a policy which was at once narrow and debasing, and reduced the populations under their sway to a state of helpless effeminacy. Then, as now, nature in these islands was wildly magnificent; the towering trees were everywhere festooned by huge parasites, so that the whole forests became one blaze of bloom. The benumbing influence of the Netherlands received a death-blow as soon as Sir James Brooke commenced his civilizing and humanizing work at Sarawak. At that time from Papua on the east to Sumatra on the west piracy was the scourge of the Archipelago. The Sulu group of islands, in particular, midway between Borneo and Mindanao, and to the south-west of the latter, was the scene of numerous captures of English and Lascar crews, some of which were afterwards liberated by the new Governor. But though the dwellers upon the coasts and the smaller islands were nurtured in piracy, those in the interior were distinguished by the simplicity of their lives and the indolence of their habits, living for the most part in voluptuous ease. Our author says—"A voyage of a few weeks brings us to these beauty spots of the Eastern seas—to an always afternoon kind of climate—since they are blessed with the heat and glory of eternal summer—to a place where winter is unknown—monsoon-swept islands oasis-like basking in a warm and shallow desert of sea. Warmed by perpetual sunshine, deluged by copious rains, and thrilled by electricity, they are really enormous conservatories of beautiful vegetation—great zoological gardens inhabited by rare birds and curious animals. In these sunny garden scenes man is the Adam of a modern Eden, primitive in habits and numerically insignificant; he has scarcely begun his battle with things inanimate, or his struggle for existence as it is known to us. At home we have man as in some sort the master of nature, but in the Bornean forests nature still reigns supreme. Here with us man wrests his sustenance from her. There she is lavish in the bestowal of things unsought."

When we who live at home at ease look upon the handsome collections of tropical plants which adorn the gardens at Kew, or the grounds of Messrs. Veitch, we can form but a faint idea of the toils of those who, for the advancement of science, explore new regions and bring home those things of beauty which prove joys for ever. Being at one time badly in want of water, which his attendants had failed to obtain, Mr. Burbidge says:—"As a last resort I had to undertake this duty myself, and descending the hill-side I found a tiny pool in the gully, from which I procured a little in our cook-pots. It was not near enough, however; and in wandering in search of more I came upon a patch of the large nepenthes, from the old pitchers of which I was able to augment my supply by carefully pouring off the rain-water from a rather liberal under-stratum of flies, ants, and other insect *débris*." And having on one occasion lost their way on returning from an exploring expedition, we are told:—"We floundered along in the gloaming, down several dangerous steeps, and across a rocky stream, in crossing which I stepped incautiously on a slippery water-worn boulder, and became thoroughly submerged in the water, which being from the heights above is icy cold, at least it seems so after one has been used to the heat of the tropics. This increased my discomfort, and poor Mr. Veitch was but little better off. Here we were at dark lost and benighted beside the rocky declivities of this mountain stream; but there was no help for it, and after vainly trying to strike a path we gave up at the base of a large tree, and putting down our burdens, we resolved to pass the night here. To mend matters, it commenced to rain heavily about seven o'clock, and I am afraid we were not so happy as the mere possession of health and strength ought to have made us. We had no food except a couple of wet biscuits and about half a glass of brandy in a flask. These we shared, and perhaps they were sweeter than the sweetest viands would have tasted had we been in dress clothes and in comfortable quarters. Then Mr. Veitch had a great find in his bag—a couple of cigars and a box of matches. Sitting in the smoking-room of a comfortable club, or in the billiard-room at home, one may smile at such a discovery; but situated as we were, cold and wet, a cigar added much to our comfort. Our two followers tried to make a shelter from the rain for themselves, but failed miserably."

The descriptive powers of our author are shown in his sketch of the voyage from the Mersey, past Cape St. Vincent, the red honeycombed rock of Gibraltar, the pretty little town of St. Roque, and when once fairly upon the blue waters of the Mediterranean, in his allusions to the snow-peaked Sierra Nevada mountains, standing out clear and cool against the sky. After passing Galeta and Malta, Port Said is reached at the end of a fortnight. An interesting account of the two days' passage through the canal is followed by brief descriptions of Suez, Aden, Penang, and at last he reaches Singapore—the "Liverpool of the East." Here the real interest of the book as a "Naturalist's Journal" commences. Hurried along to his hotel in a "gharry," hot as an oven, the author is struck with the rough hedges, clothed with red lantanas, and the neat police-station, ornamented with beautiful crimson and buff-coloured hibiscus bushes before the door. In the square were various tropical trees, one of which was completely enshrouded in rare orchids. The Singapore gardens are ornamented with the rarest of moth-orchids, planted in cocoanut shells and hung from the verandahs, or growing upon the mango and orange trees of the lawn.

A visit to Jahore and the mountain of Gunong Puloi affords an opportunity of describing a row down the river: "The silence of the night was unbroken, save by the regular dips of the oars; and as darkness increased, the tiny lamps of the fire-flies became visible here and there among the vegetation on the banks. As we glided onwards their numbers increased, until we came upon them in thousands, evidently attracted by some particular kind of low tree, around which they flashed simultaneously, their scintillating brilliancy being far beyond what I could have imagined to be possible. During my whole sojourn in the East I never saw them again in anything like such numbers. The moon rose about eight o'clock, revealing more distinctly the gradual narrowing of the river, the vegetation of which appeared to be very luxuriant, towering far above our heads. We could recognise the tufted leaves and tall stems of slender-growing pandans, standing out clear and dark against the sky, here and there the tall dead trunk of a giant tree added to the weird beauty of a scene in which the lack of accurate knowledge left much to the imagination."

Arrived in Borneo, we are at once introduced to the forests:—"In the lowland forests near the equator, a peculiar phase of vegetation is not unfrequently seen. Trees 100 to 200 feet in height tower upwards on all sides, and one walks in the shade—diffused light is perhaps the more correct expression—the tree trunks being the pillars of Nature's cathedral and the leafy branches high up above represent the roof. Above you is a world of light, and air, and sunshine, which birds, insects, and flowers alike enjoy. You feel very small and helpless as you try to catch a glimpse of the plants and flowers so high above you, and almost envy the long-armed red monkeys that swing themselves so easily from bough to bough. High up overhead, the most lovely orchids hold their court in the sunshine; here they are really 'at home' to their winged visitors. Now and then, however, you come across a newly-fallen tree—a very monarch of the woods—which has succumbed to old age and rude weather at last, and has sunk to the earth from which it sprang a seedling generations ago; its branches laden with everything inanimate which had made a home in its branches. Some of these ruined trunks are perfect gardens of beauty, wreathed with graceful, climbing plants, and gay with flowers and foliage. The fall of a large tree and its smaller dependents lets in the sun, and so the epiphytes do not suffer much for a time, and one may thus observe them in all their beauty. Here, right in the collar of the tree, is a plant of the *grammatophyllum* orchid, big enough to fill a Pickford's van, and just now opening its golden-brown spotted flowers, on stout spikes two yards long. There, on that topmost branch, is a mass of the moth-orchid, bearing a hundred snowy flowers at least; and in such healthy vigour is it, that lovers of orchids at home—supposing it could be flashed to "Stevens's" in its present state,—would outbid each other for such a glorious prize, until the hammer would fall at a price near on a hundred guineas, as it has been done before for exceptional specimens of these lovely flowers."

But the whole of this handsome volume of 360 pages, which is beautifully illustrated throughout, and affords abundant evidence of having been written by a close observer of Nature, gives so much opportunity for making quotations, interesting alike to the forester and the lover of tropical plants, that we hope to return to it in our next issue. Borneo, Labuan, and the Sulu Archipelago, as described by Mr. Burbidge, will be found to possess features of the greatest interest to all naturalists.

*The Hay and Straw Measurer.* By John Steele. London: Crosby Lockwood and Co.

So much of the produce of the farm, including hay and straw, manure, beef, and mutton, and many other things, are sold "by hand" only, when they leave the premises of the grower, and not subjected to the more strictly commercial tests of weight and measure, by which alone accuracy can be obtained, that a handy volume like the one before us, in which a few simple rules are followed by elaborate tables, thus enabling those who are the least initiated into the mysteries of Walkinghame & Nesbit to make their own calculations as to the contents of hay and straw stacks, manure clamps, logs of timber, and the amount of excavations in dykes and drains, must be welcomed by the farmer and the buyer of fodder and straw stacks. An hour devoted to the study of Tables I. and II. will enable the reader to ascertain with accuracy the contents of round and oblong stacks of any size; while a study of Table III., with some knowledge of the properties of various kinds of fodder, will enable him to ascertain the approximate weight, and thereby arrive at the market value of his produce. The slipshod method of merely guessing at the contents of stacks and the weights of animals, which is too often relied on by farmers in this country, is directly opposed to American practice, where the weighbridge is regularly used for cattle, and even for horses and mules, and accuracy is thus ensured. Among other useful tables in this little book we must not overlook those for calculating the cubical contents of tanks and reservoirs, a ready reckoner for wages, and a table for calculating the weight of produce per acre, from ½ lb. to 28 lbs. per square yard. The calving table is also a very useful one for cattle breeders. When another edition is called for we would suggest the addition of a simple diagram, with accompanying directions and tables, for finding the weight of cattle by measurement.

*The Florist and Pomologist.*—The January number of this high-class serial contains a notice, with a beautifully coloured plate, of a rhododendron, styled Meteor, which was raised by Mr. Waterer, of Knap Hill, near Woking. There is also a notice, with coloured plate, of a remarkably handsome bunch of grapes, known by the synonymous name Marocain, and which was introduced by Mr. Rivers. Among the other articles we notice, Classification and Culture of Tulips. Fruit-tree Lifting and Root Pruning. Perpetual Flowering, or Tree Carnations. Roasted Turf. The Carnation and Picotee Bloom of 1880. The Gladiolus and Asparagus Culture. There is also some interesting Garden Gossip, and practical hints on Suburban Gardening.

## OUR FOREIGN EXCHANGES.

In the January number of the *Revue des Eaux et Forêts* there is a continuation of a series of papers on the Pastoral Husbandry of the Alps, by M. Briot; a brief history of sylviculture in France and Germany, by M. A. Gurnaud; and a report of experimental observations on the increase of the bulk of trunks of trees in relation to the development of leaves.

In the *Revista de Montes* of Spain appear a series of articles on the effect of woods on the health of the community, by Don Gabriel de la Puerta and Don Raffael Saez y Palacios; and a series of papers on cypress-like plants, their habits and their homes, by Don Maximo Laguno. The year is commenced with a paper and tabulated list of localities, areas, &c., of forests which it is desirable should be restored; stating kind of trees suitable, time which would be required for the work, and the probable expense, by Don José Muños; and the first of a series of papers on the Vipers of Spain, by Don Eduardo Bosca.

From Leipzig has been received a number of the *Illustrirte Jagd-Zeitung*, in which is an article by Dr. R. Hess, Professor of Forest Science in the University of Giessen, on the injury done to game by weasels; and reprints from the *Centralblatt für das gesammte Forstwesen*, of other papers by him on injuries done to forest trees by different quadrupeds and insects, and from *Forstwissenschaftliches Centralblatt*, on the expense and results of blasting roots of felled trees.

From Denmark has been received reprints from the *Zeitschrift für Forst- und Jagdwesen*, containing a review of a Treatise by Dr. P. E. Müller, Professor of Forest Science in the Agricultural Institute of Copenhagen, on the effects of Beech humus on sand and clay, with analyses of soil, by M. C. F. Juxen; and a paper on the Kagerups-beech in the Gripskov, by Mr. W. Glydenfeld, *Jagdjunker;* and with them a reprint of an account of the Congress of the Silesian *Forst-vereins* in July last at Liegnitz, by Forstmeister Guse, of Breslau.

From St. Petersburg there has been received an excerpt from the *Golos* of 29 Dec., 1880, containing a communication from Professor Zabel in the Crimea, of which the following is a translation:—"The long-expected *phylloxera* has at length appeared in Russia, and attacking the Crimea it has called forth the immediate energetic action of the Government. Following the example of Switzerland, which stamped out the plague by cutting off the attainted branches and burning them, and by killing the insect by means of destructive fluids, these means of extermination have been adopted by our authorities; but we have no guarantee that the end has been gained; and who can assure us that the insect is not to appear in other vineyards? In my pamphlet, entitled 'Destruction of Vineyards: insect, *Phylloxera vastatrix*,' 1878, I reported my experience on this matter. I stated what were my remedial plans of extermination, and I submitted the views I entertained, based on articles on the subject which had appeared in French and German works. I again invite the attention of vine-growers and wine manufacturers to sulphur-carbonic acid as a means of destroying such pests. I have used this to destroy *Schizoneura nigra* on apple trees in the proportion of one-tenth of water. The application of this fluid would, I believe, be very beneficial by the destruction of insects of various kinds which now infest and ruthlessly injure many different kinds of plants which we have under cultivation."

John C. Brown.

# The Proposed School of Forestry at Epping Forest.

THE following is the full text of the memorial presented to the Epping Forest Committee of the Court of Common Council, by Mr. Alexander Mackenzie, the Superintendent:—

Gentlemen,—At the request of your Forest Sub-Committee, I have the honour to report to your Worshipful Committee a suggestion made by me at a meeting of the former held on 13th inst. That suggestion was that a School of Forestry be established in connection with Epping Forest. The subject has occupied my mind for some considerable time, and I may mention that the establishment of such an institution in England has long been discussed and thought over by others interested in the proper management of our woods and forests, but as yet no satisfactory settlement of the subject has been arrived at, mainly for the want of a suitable tract of land in a convenient spot.

Now there are a combination of circumstances in connection with Epping Forest, all of which, it appears to me, tend to indicate a hope of success which has hitherto been wanting.

Amongst these may be mentioned the fact that a Royal Prince is at the head of affairs, and seems to interest himself in the proper management of the forest; that the Corporation of the City of London are desirous of fostering technical—or what for my present purpose I prefer calling practical—education; that you possess about six thousand acres of land, all more or less forest, neglected, detached, and inharmonious in effect by reason of its having been, from circumstances well known to you all, so very much subdivided, that an effort must be made, as soon as the outlying portions are restored to your care, to blend them all into one harmonious, albeit diversified, whole; consequently the land must be carefully surveyed and mapped out accurately, in order that a reliable plan may be obtained on which to work out a scheme which may guide the Conservators of the forest for all time; and lastly that much planting, and the careful thinning and pruning of existing trees must be judiciously prosecuted for many years.

The execution of all these works would form the best possible groundwork for the practical training of the foresters in the future.

Added to all the above advantages should be mentioned the fact that at the present time few, if any, of the woodlands and forests belonging to the English aristocracy are managed with either economy or skill, which would be no longer the case if such a school as I have suggested were in existence in England. But the men intended for these appointments would not form the only students. At present the youths intended for the management of our vast Indian forests are educated and trained for their practical duties, either in the German or French forests; but there is no doubt that if a proper and efficient School of Forestry existed in England there would no longer be any necessity for sending these youths abroad to be so educated.

From what I have already said you will at once realize the importance of the subject I have the honour to bring before you.

I may be allowed to state for the information of your Committee, that the present method of selecting candidates for the Indian Forest Service is precisely similar to that adopted for Indian Civil Service, viz., by competitive examinations. These are held once or twice a year, and candidates must pass an examination in English, French, mathematics, the elements of four sciences, surveying, use of instruments, &c. If the candidate is successful he must then be prepared to pass three years in France or Germany, principally at his own expense. The necessary preliminary knowledge and expensive after-training practically exclude from this education and field of labour the home-trained sons of English foresters, the limit of age (17 to 21) practically excludes University men, and men who have acquired experience in practical woodland cultivation. The selection is therefore to a great extent confined to youths who have failed to pass in the higher grades of examinations, and who have no aptitude for the profession they seek to follow, scarcely knowing the difference between larch and spruce or loam and marl.

There is at present an advertisement by the Indian Office for the selection of five young men, "if as many are found qualified," to be trained in France for the Indian Forest Service. The school at which they are to receive their training is that at Nancy, an institution which is acknowledged to be utterly inadequate to give the proper training necessary to produce first-class forest officers for the management of Indian or Colonial forests, in addition to which the charges, as before stated, are almost prohibitive: each pupil has to pay the sum of £180 per annum for maintenance and school fees (£40 per annum in addition to the first-named sum being paid by Government towards school fees). This £180 per annum may be reduced to £120 by the industry and good conduct of the pupil, which reduction is made at the discretion of the Government.

This sum can only be paid by the comparatively rich, and entirely excludes those who by nature and early training are best calculated to fill, with advantage to their employers, the posts of forest officers at home or abroad.

Supposing the Government have an average of fifteen pupils per annum (which I believe is the usual number) training for the Indian Forest Service, we have a net expenditure of £3,300 per annum.

But it can easily be understood that the final training for any special colony must be obtained in that colony itself, and it will therefore be seen how fallacious the whole present system is; in fact the want of such an institution as I have suggested, where the practice as well as the science may be obtained, is a complete bar to the employment in the management of our colonial forests of some of our best practical men. It is equally the case with our home forests and tracts of barren land, thousands of acres in extent, which exist in this kingdom, and remain totally unproductive to their owners.

Instead of this present system of educating Indian foresters which I have attempted to describe, I would suggest that—

1. Candidates be selected from the middle classes, the sons of farmers foresters, and such practical men.
2. They should have received a fair education, and possess a little practical knowledge of soils, trees, and botany.
3. Their training at the School of Forestry should include practical forestry, mathematics, engineering, and architecture, to a limited extent, surveying, levelling, and land-measuring, book-keeping, and geology, also that they should have facilities for acquiring, at their option, Latin, French, and German.
4. The course of study should extend over four years, the first two to be spent at Epping Forest, where (the trees have been neglected for so many years; it will be the object of the staff to organize order and produce regularity out of disorder and chaos; the third year should be spent on the New Forest, which is a tract of sufficient extent, having over 60,000 acres, and having been in Government keeping may be supposed to be a further advance and development of the principles pursued by the student during his first two years at Epping; the fourth year should be spent at Windsor, where may be seen the full development of the principles commenced by the student at Epping. After this course of training, those pupils who have diligently applied themselves to their studies during the four years, should be drafted off to other fields of usefulness either at home or abroad.

Such is a rough outline of my scheme, which I am convinced would meet with success, for no one can contemplate the hundreds and thousands of barren acres throughout the country at present of little or no value to their owners, without being satisfied that by intelligent planting and cultivation they might be made useful and profitable; and also with superior knowledge might the hundreds of acres of woodland now existing be rendered more profitable than they have hitherto been; nor can one look abroad without being struck with the vast fields which are rapidly opening in India and the Colonies for the employment of the best trained arboricultural skill which education and science can produce.

In urging your Worshipful Committee to secure the powerful influence of the Corporation in inducing the Government to assist in the Establishment of such an institution as I have sketched, I am of course fully aware that such an end will not be attained without considerable difficulty, for notwithstanding the acknowledged importance of the subject, it was urged upon the Government some years ago without success. One of the objections, however, raised at the time, namely, the want of a field of operation, has been practically got over by your acquisition of Epping Forest. The example has been set by America, where a Bill has been introduced to the Senate for the establishment of such a school, entirely at the cost of the country; the want has also been recognised and supplied by most of the States on the Continent, and it is also fully recognised in this country; so that its establishment can only be a question of time. I therefore think this is a most favourable opportunity for a Committee which has done so much for the preservation of Epping Forest and Burnham Beeches, to take the initiative in the promotion of a scheme which must be undertaken by some such authority at no distant date.

I need not add that, should your Worshipful Committee take this matter into your favourable consideration, nothing shall be wanting on my part to render my scheme as complete and useful as possible.

## GROWTH OF TIMBER TREES.

A PAPER was read by Sir R. Christison at the last meeting of the Edinburgh Botanical Society upon the "Growth of Wood in 1880." In a former paper, he said, he endeavoured to show that, in the unfavourable season of 1879, the growth of wood of all kinds of trees was materially less than in the comparatively favourable season of 1878. He had now to state results of measurements of the same trees for the recent favourable season of 1880. The previous autumn was unfavourable for the ripening of young wood, and the trees in an unprepared condition were exposed during a great part of December, 1879, to an asperity of climate unprecedented in this latitude. This might have led one to expect a falling off in the growth of wood, and it appeared, from comparison of measurements, that, with very few exceptions, the growth of wood last year was even more below the average of favourable years than that of the bad year 1879. Thus, in fifteen leaf-shedding trees of various species, exclusive of the oak, the average growth of trunk girth in three successive years was—1878, 8-10ths; 1879, 45-100ths; 1880, 3-10ths and a half. In four specimens of the oak tribe, the growth was—1878, 8-10ths; 1879, 77-100ths; 1880, 54-100ths. In twenty specimens of the evergreen Pinaceæ the growth was—1878, 8-10ths; 1879, 7-10ths; 1880, 6-10ths and a half. After giving details in regard to particular trees, Sir Robert stated, as general deductions from his observations, that leaf-shedding trees, exclusive of the oak, suffered most; that the evergreen Pinaceæ suffered least; and that there was some power of resistance on the part of the oak tribe which was remarkable, the power of resistance of the Hungary oak being particularly deserving of attention. In another communication on the "extent of the season of growth," Sir Robert stated as the result of observations on five leaf-shedding and five evergreen trees, that in the case of the former, even in a fine year, the growth of wood was confined very nearly, if not entirely, to the months of June, July, and August;

while in the case of the latter growth commenced a month sooner, terminating, however, about the same time. Mr. A. Buchan said it was proposed that the inquiry should be taken up more extensively over Scotland.

## LINLEY.

In a remote corner of Shropshire, close to the Welsh border, and accessible only at infrequent intervals by a primitive railway, lies one of the seats of the old family of More, now represented by Mr. R. Jasper More.

The approach is by means of an avenue of oaks a mile or more in length, the oaks being planted in double or even in triple line. The mansion, a solid Italian structure built by Inigo Jones, is at present unfinished as to adornment, but by the completion of the parapet and balustrade, and the formation of a terrace garden along one front, its appearance will be greatly improved. The flower garden and ornamental shrubberies have for the most part to be made or reconstructed, the special feature of the place consisting in a long valley, which recalls the Trosachs, and through which brawls a noisy trout stream flanked on either side by dense woods, and terminated by a noble heather-clad hill, which in Scotland would certainly be called Ben More were it not that that appellation is preoccupied. It might not inappropriately be so designated in Shropshire! The woods on either side of this charming valley consist principally of oaks, British and scarlet, and beech, and whitebarked birch, with an admixture of larch, Scotch and silver fir and spruce. The admixture of the towering spires of dark-leaved conifers amid the oaks is very beautiful, and when, as when we saw them, the branches of the oaks were picked out by the silver film of lightly fallen snow, illumined by a glorious sun, and set in a background of azure sky, the effect was specially beautiful. Among these woods there are some trees whose stately form and noble proportions demand special notice—in particular a silver fir, whose giant bole, straight as a dart, and relatively short lateral branches, recalls the pictures of the Californian sequoias when full grown. There is also a spruce of noble proportions and beautiful symmetry. Scotch firs exist in abundance, their richly-coloured bark and spreading black tops giving them a most characteristic appearance. But the most surprising feature, perhaps, is the clump of larches of about the same size and age as the famous larches of Dunkeld. The planting of this beautiful valley was evidently done by a man of knowledge, judgment, and taste, the groups being placed with a view to effect. Monotony of form and colour has been avoided by the disposition of the masses, and the admixture of deciduous with coniferous trees. Where, owing to the lie of the land, a long, straight line was inevitable, the uniformity has been broken up by an isolated tree, judiciously placed to vary the line and convey a sense of distance.

The plantations have been more or less neglected in the course of years, so that many of its finer features have been allowed to be overgrown and concealed. This is being remedied under the superintendence of Mr. Boscawen, whose excellent taste, knowledge of trees and their requirements, and experienced judgment are called into play in the removal of old useless timber which has been allowed to block up the finer features of the original design and which it is his aim once more to bring into view.

Climbing the hill on one side of the valley, getting fine views as we ascend of the neighbouring hills, we come to a long avenue of beech running along the hill-side and doubling back along its crest. The trees are of considerable age and at some time or other have been pollarded. Near one end of this avenue a tax-gatherer was murdered and the money taken from him hidden beneath a bush hard by. The murderers were in due course hanged on a gibbet not far off, but—whether by accident or design we know not—they were not immediately killed by the act of the hangman, but remained suspended in a living state and were kept alive for a time by an old woman from a neighbouring village, who ministered to them at night and fed them with candle ends! We tell the tale as we heard it, and fear that in any case the sympathy was not with the tax-gatherer. From this avenue the road descends to the public road which crosses the oak avenue not far from the front of the house.—*Gardeners' Chronicle*.

## A LOVER OF THE PINE.

Although we usually treat of the pine and other timber trees simply as articles of commerce, yet it will not be amiss to occasionally revert to the literature which the subject has awakened, and which has exercised a strange fascination. There need then be no hesitation in giving the following extract from a work by a New England writer, Henry David Shorean, describing an excursion into the Maine Woods, undertaken by him some 30 years ago:—"Strange that so few ever come to the woods to see how the pine lives and grows and pines, lifting its evergreen arms to the light,—to see its perfect success; but most are content to behold it in the shape of many broad boards brought to market, and deem *that* its true success! But the pine is no more lumber than man is, and to be made into boards and houses is no more its true and highest use than the truest use of man is to be cut down and made into manure. There is a higher law affecting your relation to pines as well as to men. A pine cut down, a dead pine is no more a pine than a dead human carcase is a man. Is it the lumberman then who is the friend and lover of the pine, stands nearest to it, and understands its nature best? Is it the tanner who has barked it, or he who has boxed it for turpentine, whom posterity will fable to have been changed into a pine at last? No! no! it is the poet; he it is who makes the truest use of the pine,—who does not fondle it with an axe, nor tickle it with a saw, nor stroke it with a plane,—who knows whether its heart is false without cutting into it, who has not brought the stumpage of the township on which it stands. All the pines shudder and heave a sigh when *that* man steps on the forest floor, No; it is the poet, who loves them as his own shadow in the air, and lets them stand. I have been into the lumber-yard, and the carpenter's shop, and the tannery, and the lampblack-factory, and the turpentine clearing, but when at length I saw the tops of the pines waving and reflecting the light at a distance high over all the rest of the forest, I realized that the former were not the highest use of the pine. It is the living spirit of the tree, not its spirit of turpentine, with which I sympathize, and which heals my cuts. It is as immortal as I am, and perchance will go to as high a heaven, there to tower above me still.

## Recent Sales of British Timber.

PERTHSHIRE.—A sale of ash, beech, elm, &c., took place on the Ruthven Estate on December 9, and exceptionally high prices were obtained for some of the lots. The figures ran from £1 10s. up to £9 per single tree, the latter price being paid for a venerable poplar. The bidding was very brisk. The principal buyers were from Perth, Montrose, Forfar, Blairgowrie, and Dundee.

DERBYSHIRE.—On the 15th December Messrs. J. Turner & Son held a sale at Tupton, near Chesterfield, of timber, underwood, and poles. Only one lot of underwood, consisting of about 9½ acres, was sold, and that realized £39, although we understand that three lots were subsequently disposed of. Lot 7 of timber and poles, consisting of 5,145 ft., principally oak, was withdrawn at £250; lot 8, consisting of 19 oaks (338 ft.), 1 beech (84 ft.), 3 chestnut (191 ft.), 3 elm (101 ft.), 1 holly (10 ft.), 2 limes (141 ft.), and 2 elm poles, went for £60. All the above was of medium quality; the timber trade is very depressed in the district.

STAFFORDSHIRE.—On the 15th December Messrs. Lythall & Mansell conducted a sale at Tamworth of 1,433 oak, ash, elm, beech, and poplar trees, standing on the Drayton Manor Estate. The whole were divided into 26 lots, three of which were withdrawn, and the remaining 23 lots realized in all £2,650. Lot 6, consisting of 45 oaks, fetched £255; lot 7, consisting of 48 oaks, fetched £215; and lot 11, consisting of 49 oaks, went for £205. The prices were considered very satisfactory. There was a large attendance, and among the buyers were Messrs. Marsh & Co., of Oldbury; Mr. J. Stableford, of Leicester; Mr. Woolley, of Derby; and Messrs. Turner & Son, of Barlaston, Stoke-upon-Trent.

SOMERSET.—On the 17th December Messrs. Harding & Sons conducted a sale at Witham Friary of about 260 timber trees, grown on the Duke of Somerset's estate, when the following prices were realized:—Oak (small size), from 11d. to 1s. 6d. per ft.; ash from 1s. 5d. to 1s. 11d.; birch, 6d.; spruce, 7d.; elm, 11d.; larch, 11d.; poplar, 6d.; beech, 7d.; alder, 7d. and 8d. Among the purchasers were Mr. H. Hayward, Mr. Padfield, Mr. Cornish, Mr. Grant, and Mr. Newport, of Frome; Mr. J. Cruse, Bruton; Messrs. White & Son, Brooksover; Messrs. Ashman, Leigh; Mr. Randell, Warminster; and Messrs. Dorman Bros., Maiden, Bradley.

**Hopetoun, West Lothian.**—On the 29th November there was sold by public roup at Blackness a large quantity of cut wood, consisting of ash, elm, oak, chestnut, plane, beech, larch, spruce, fir, &c. The result was very satisfactory, all sorts being in demand, especially large oak and plane or sycamore.

**Hants.**—On the 4th January, Messrs. G. Etherington & Son sold by auction, at Liss, about 400 oak and ash trees, as previously announced in our advertising columns. The ash realized from £3 to £4 per load, and the oak between £4 and £5 per load. The purchasers were Messrs. Durman, Puttick, and Wakeford.

Northampton.—On the 10th January, Messrs. Beesley & Son held a sale of timber at Whittlebury and Wappenham, but it did not go off very well, and trade is reported as being only middling.

Bucks.—On the 11th January, Mr. R. P. Clarke disposed of by auction, at Hughenden, about 550 loads beech, 79 ash, and 11 cherrywood timber trees, on the Hampden estate of the Earl of Buckinghamshire. There was a good attendance of purchasers, and the whole of the lots were sold. Beech realized from 1s. 2d. to 2s. 6d. per ft. cube, and ash from 1s. 2d. to 2s.

Herefordshire.—*Coppice Wood Sale at Shobdon Court.*—This important sale, which comprised 75 lots, was held at Mortimer's Cross Inn, Aymestry, on Saturday, 18th December, when every lot was sold. There was a large attendance. Mr. S. Sampson was the auctioneer.

Wiltshire.—On January 4th, Messrs. Foley & Son sold by auction, at the George Hotel, Trowbridge, about 500 elm trees standing on estates at Hilperton and Poulshot. There was a very large attendance of the trade present, and the prices for the various lots ruled high, all being eagerly sought after. Amongst those present were Messrs. Robbins, Lane, and Pinniger, Marlborough; Hill, Warminster; Adam Twine, Wootton Bassett; Usher, Melksham; Deverell, Holt; Milsom and Cuzner, Bath; Holbrow, Limpley Stoke; Trowbridge Saw Mills Co., &c.

**Berks.**—Mr. King, of Abingdon, sold by auction at Milton on the 13th inst., a small broke of fine elm and poplar timber, standing at Milton, at Steventon. There was a good company present, but trade was decidedly slow. The best of the elms, with upwards of 100 ft. in a tree, realized a bare 1s. per ft., three fine trees, making £16 10s., were purchased by Mr. C. J. Talbot, of Reading. Medium-sized elms ranged from 6d. to 9d. per ft., a good many very useful trees being sold at the lower figure. Some remarkably long and large black poplars changed hands at less than 6d. per ft., four trees, containing over 400 ft., going at £9 5s. The principal buyers were Talbot, Reading; Hobro, Steventon; Gerring, Milton; and others from the immediate neighbourhood. It may be said that timber in this district is now selling at lower prices than have been known for many years past.

**Somerset.**—An important sale of timber was held by Messrs. Wainwrights & Heard, of Shepton Mallet, at Stratton-on-the-Fosse, near Bath, on the 12th January. The timber comprised about 1,560 maiden oak, elm, ash, and beech trees, together with about 300 larch and Scotch fir poles and 500 pollards and saplings. The sale attracted a considerable number of gentlemen engaged in the timber trade from various parts of the county. The timber was divided into 121 lots to suit the convenience of purchasers, and the whole of the lots were disposed of at satisfactory prices, the chief purchasers being Mr. Mark Hill, Warminster; Messrs. Snow & Copy, Glastonbury; Messrs. Ashman, Leighton Mendip; Mr. Holbrow, Limpley Stoke; Messrs. White & Son, Frome; and Mr. J. H. Stamp, Bristol.

On the 13th January, Mr. J. Pool conducted a sale at Staplefitzpaine, of about 700 elm trees, 300 ash trees, and 300 oak. There was a good demand for elm timber, which sold readily at from 10d. to 1s. 2d. per ft., according to size and quality, average about 1s. Ash, a good demand, at about 1s. 3d. Oak, very little sold. Buyers attended from Bristol, Bridgwater, Taunton, and other places.

OXFORD.—At the sale announced to take place at Cropredy, by Mr. Simmons, on the 18th January, there was a very scanty attendance, owing to the foul weather, and consequently very little was disposed of.

GLOUCESTER.—On the 11th January, Mr. Edward Luce conducted a sale on the Tytherington Estate. Elm realized from 1s. to 1s. 2d. per cubic ft.; ash, from 1s. to 1s. 8d.; beech, 10d. to 1s. The demand was very good, especially for the elm, and the bidding was very spirited. The buyers were Mr. Stamp, Bristol; Mr. Lustey, Ulvey; Mr. Hadley, Cambridge; Mr. Organ, Olveston; Mr. Workman, Worcester; and Mr. Cullimore, Thornbury.—*Timber Trades Journal.*

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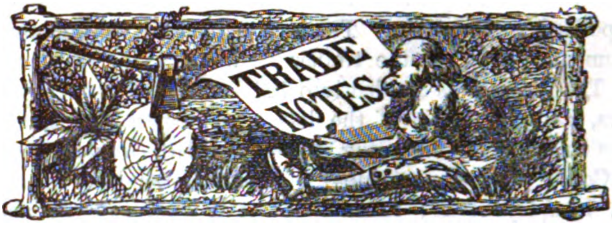
**TREES AS LIGHTNING CONDUCTORS**—M. Colladon has pointed out that a poplar or other tall tree may, if its roots strike into damp soil, serve as a lightning-conductor to protect a house; and he thinks he has verified this conjecture by examination of a number of individual cases of lightning stroke. In the case, however, where the house stands between the tree and a piece of water, a pond or a stream, the shortest path for the lightning from the tree to the wet conductor would be through the house.

**BLACK ALDER (PRINOS VERTICILLATUS).**—How very beautiful this is looking just now, especially on low grounds! In clumps and as single plants it seems to warm up the embrowned landscape, and remind one of a warm autumn sunset. Is there a more ornamental berry-bearing plant? One could almost regret that they are native plants, as otherwise we might sometimes see them in the border or on the lawn. Though usually found on low and moist ground, I have seen many a fine specimen growing on the upland. I use it for lawn planting, and shall continue to do so, as I find it to do well, besides being exceedingly ornamental at a time when most other plants have taken on the sober hues of winter.—*Rural New Yorker.*



We have received the following Trade Lists and Catalogues :—

William Fell and Co., Hexham, "Priced Catalogue of Forest Trees, Ornamental Trees and Shrubs." This contains a pretty complete list of seedling and transplanted forest trees, coniferous trees, ornamental trees and shrubs, weeping trees, dwarf, evergreen, shrubs and fruit trees. There is also a select list of Alpine and Herbaceous plants. We notice in addition that this firm supply foresters' and gardeners' tools and sundries. Thomas Kennedy and Co., Dumfries, "Catalogue of Forest, Fruit, and Ornamental Trees," a good list of seedling and transplanted forest trees, with extra large selected forest and ornamental trees and shrubs which have been frequently transplanted, also hardy ornamental trees and coniferæ, pendulous trees, fruit trees, &c. R. and A. Morrison, Pinefield Nurseries, Elgin, N.B. "Retail List of Forest and Ornamental Trees, Deciduous and Evergreen Shrubs, Roses and Fruit Trees." This appears to be well got up, and we gather that the stock of this firm is the largest in the north of Scotland. Thos. S. Ware, Half-Farm Nurseries, Tottenham, London, "Catalogue of Evergreen and Deciduous Trees and Shrubs, Roses and Fruits," and "A B C Bulb Guide," both capital lists. Dickson and Co., of Waterloo Place, Edinburgh, have sent us their "Catalogue of Vegetable and Flower Seeds," which owing to the information contained in it, combined with the capital illustrations, constitutes quite a handsome and valuable little guide. William Hume, of 195, Buchanan Street, Glasgow, has sent us his "Illustrated Catalogue of Patent Continuous Wrought iron Fencing," which contains descriptions with illustrations and prices of his various manufactures for the improvement of landed property in the way of iron and wire fencings, hurdles, railings, flakes and nettings, tree guards, field and entrance gates, &c.

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Large Acacia Dealbata.—In the garden at Rickerby we learn that there is a remarkably fine specimen of this beautiful Australian shrub in full flower, and it will probably continue in good condition for a fortnight hence. The specimen is 16 ft. in height, and about 28 ft. through. It might be interesting to know the conditions under which such a fine plant has been grown, whether planted out in free soil, or in a pot or tub, and to what condition of temperature subjected. Even in a small state this acacia is a highly desirable plant, and we recommend all who does not possess it to add it to their collection, as it cannot fail to give satisfaction.—*Garden.*

**Tree Notes from Vienna.**—Most of the Ailantus and plane trees of the avenues in the Ringstrassen at Vienna are being removed on account of their dying off during last summer. Various opinions have been given with regard to their loss; a committee of inquiry composed of practical authorities assigned the cause chiefly to the bad state of the roots and the cold of last winter. Their unhealthy state may be chiefly ascribed to their not having the soil accessible to atmospheric influence, and want of sufficient drainage. The waterlogging is mainly due to the excessive use of frequent heavy syringing in order to keep the avenues cool during summer. In attaining this object the trees are often deluged by quantities of water, which, owing to the heavy, retentive character of the soil and insufficient drainage, cannot escape sufficiently fast. The trees have therefore got gradually into a bad state of health and the easier fell victims to the effects of last winter with its frosts, suddenly succeeded by thaws. As a singular instance, I may mention that in this village several years ago, twenty-six large Ailantus were planted on a very exposed place, in a rather sandy and dry soil. Very little care, except a few waterings the first summer, was bestowed upon them; since that they have been thriving very satisfactorily, and last winter only one of them succumbed to the effects of the frosts. In the gardens here, and also in the public gardens at Vienna itself, the plane and Ailantus have tolerably well withstood the excessive cold. It is mostly the sickly trees in the avenues which perished in such great numbers. These observations were made during last summer.—Louis Kropatsch, Laxenburg, in *Garden*.

**Deciduous Trees.**—One of the most curious things to be seen amongst deciduous trees during the leafless months is the appearance here and there of Turkey oaks, hornbeam, and certain beeches upon which some of the foliage hangs with singular tenacity—dead, brown, and useless, to all appearance, and yet adhering to the trees as though serving some useful purpose. A very interesting subject for the attention of the plant physiologist does this peculiarity present, and not least is it a feature worthy the attention of planters who may desire to retain, in landscapes or wooded scenery, some elements of colour that offer under the wintry skies a strong and not unpleasing contrast to the heavy greens of Scotch and other firs. If we note branches broken perhaps from off our truly deciduous oaks in the leafy months, we find that although leaves and wood may die, the leaves adhere, even in death, with singular force. At the first glance it might appear that on the Turkey oaks a similar cause was operating; this, however, is not so, as the wood is lively enough. What, however, is noticeable is, that whilst the leaves are shed cleanly by the robust yearling wood, it is only the weakly shoots from the older wood that retain the ripened leafage.—*Gardeners' Chronicle*.

**Forest Flora of Cochin China.**—M. S. Pierre, the director of the Botanic Garden at Saigon, has begun the publication, under the auspices of the French

Minister of Marine, of a work on the forest trees of Cochin China. The part before us consists of a series of large folio lithographic plates of various species of *Magnoliaceæ*, *Dilleniaceæ*, *&c.*, accompanied by descriptive letterpress. The leaves of these are for the most part shown of natural size, and as in many cases they are literally gigantic, a good deal of labour has been thrown away, and space occupied, which might more profitably have been occupied by illustrating other species from this comparatively little known country.—*Gardeners' Chronicle.*

THE MAHWA TREE.—The Mahwa tree (*Bassia latifolia*) is such an important Indian tree that it is satisfactory to find there is no chance of its becoming scarce. We gather this information from an official letter from the Chief Commissioner of the Central Provinces to the Government of India, in which he says that, as a general rule, the Mahwa tree is not destroyed by the people. It is too valuable for its produce to be cut down and sold as timber; ordinarily the trees cut down are those that have ceased to bear fruit. The diminution in Mahwa trees over considerable areas results from the enormous extension of cultivation there has been during the past fifteen or twenty years. They have disappeared in common with other forest trees. Of the Mahwa trees, however, many are left, and these are seen now in the midst of cultivation. Being valuable, they have been spared when other trees have been cut down. But no seedlings grow up in the cultivation, and there are therefore no young trees. With the view of ensuring the preservation of the tree in village areas, the Mahwa has been included amongst trees which proprietors prohibit from being cut down without proper authority. It will be remembered that the fleshy flowers (not fruit) of this species constitute an important article of food.—*Gardeners' Chronicle.*

BLOWN-DOWN TREES BLOWN UP AGAIN.—We reported a year ago that some trees which had been blown down in the valley of Spey, above Kingussie, had been blown up again in the great gale of December last. Many people refused to believe the story. Will they kindly read the following, just received from the correspondent who told us of the curious occurrence this time last year?—"The blown-down trees which were blown up again (of which mention was made in your columns) by the memorable gale of the 28th December, after having withstood all the blasts of the year 1880, are still standing as firm as if nothing had ever happened to them. Not a few have from time to time gratified their curiosity by coming to see them, and one and all have laid it down as an unequalled occurrence."—*Elgin Courant.*

STEALING UNDERWOOD.—Before the Wingham Petty Sessions, on the 6th inst., Michael O'Brien, of Canterbury, was summoned for cutting and stealing a quantity of underwood belonging to Montague Kingsford, Esq., at Adisham, doing damage to the extent of 5s. Early on the morning of Sunday, the 7th November, Mr. Collard, farmer, of Garrington, saw a pony attached to a cart standing in the highway near a wood belonging to Mr. Kingsford, with a man in charge of it. He also noticed another man engaged close to the wood. A short time afterwards the cart was stopped by police-constables Pryor and Davis, in which the defendant and another man were seated. In the vehicle the policemen found a bundle of sticks which were found to exactly correspond with the stumps where sticks had been cut in the wood. There was only one piece of dogwood in the bundle, and only one stick of that wood had been cut. Defendant said he bought the sticks from a man he met along the road. He was cutting grass when seen near the wood. He was convicted and fined £1, 5s. damage, and 13s. costs, or a month's hard labour.

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THE accounts which reach us from the country of the great severity and protracted nature of the winter, supply us with many instructive facts and incidents worthy of note, as containing warnings and examples to be remembered by the arborist. The injury done to trees and shrubs by the keen blast, biting frost, and heavy snowfall, is of an unparalleled nature in recent years. Taking the damage altogether which has been done to our woods and plantations and ornamental trees, especially in the southern parts of the kingdom, it has not been equalled since the rigorous winter of 1860-61; and even in that remarkable season it was chiefly the less hardy ornamental trees—conifers and others of recent introduction—which suffered so dreadfully, and whose hardiness had not hitherto been so thoroughly tested. Our common forest trees passed almost scatheless through the severities of that winter; but this season they have suffered quite as much from storms of wind and snow as their rarer kindred, the ornamental trees. Many a stately tree has been levelled to the dust by the fury of the gale; and still more of the trees of the forest have been maimed and disfigured, by the snow resting on their branches, and accumulating until by its great weight they were torn from their sockets and dashed to the ground, thus demolishing many a noble tree, or ruining the symmetry and healthy look of their fair-proportioned umbrageous tops. The details which appear in our pages give an account of but a mere fraction of the immense destruction which has been wrought amongst trees and shrubs during the past few months. A large proportion of the damage done to our woodlands on such occasions is never reported in public journals; and the loss sustained throughout the country cannot therefore be even guessed at with any approach to accuracy, but in all probability it amounts to a far larger sum than most people would ever dream of. However, in this there is but little to discourage the most diffident tree planter, because the overturned, broken, or damaged timber trees will, in most instances realize a fair return for the space they have occupied; and in the case of ornamental trees and shrubs, the arborist has received a lesson which will be of great value, in teaching him to avoid planting those species of plants which he now knows are incapable of bearing with impunity the rigours of our severest winters.

Whenever damage has been done, either in plantations or among ornamental trees, no time should be lost in clearing away the wreckage and disposing of it to the best advantage. When this is done, immediate action ought to be taken to repair the loss as quickly as possible, by planting a proper selection of healthy young trees, which by their vigorous growth will soon obliterate all traces of past devastation. It is here that the practised skill of an observant and intelligent forester is best displayed; first, in the proper preparation of the ground; second; in the judicious selections of the right kinds of trees to plant, so as best to attain the object in view—whether for profit, shelter, or ornament, or all combined; third, the proper mode of planting each size and species of tree; and last, but by no means least, in providing for their due protection, and careful after management, so that the best possible results may be obtained in the shortest period of time. Nothing can be more unwise than hap-hazard tree-planting; and all who have not the requsite experience themselves, should be careful to obtain the services of a thoroughly skilled and intelligent forester.

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THE report on the Woods and Forests of South Australia, for the year 1879-80, shows a marked advance in forest conservancy in that enterprising colony, and great skill and wisdom on the part of those who are appointed to carry out the views of the colonial parliament on the subject. This is, no doubt, due in a large measure to the well-directed skill and ability of the conservator, Mr. John E. Brown, and the great enthusiasm he has infused into all those with whom he has to work, in carrying out the plans which he has so ably devised for the regeneration of the South Australian Forests. In the interesting report before us, he gives very full details of the operations carried on during the year, and also of the past state and future prospects of the forest reserves of the Colony.

The extent of the forest reserves has been increased during the year by 4,762 acres, the total area now reserved in the Colony being 239,368 acres. The reserves are distributed throughout various parts of the Colony, but chiefly in the northern and southern districts. During the year 906 acres have been put under a crop of trees in these reserves, by planting, seed sowing, and natural regeneration; which, added to the 934 acres planted in previous years, gives 1,840 acres now enclosed, and put under a crop of trees by special cultivation, and designated plantations. This can only be called a small beginning, considering the immense area which still remains to be treated, but it is nevertheless highly creditable to the Forest Board of the Colony that they have accomplished this much in the short time since the Board was constituted.

In financial matters the Board appears to be also well managed, and shows a good balance on the right side of the ledger. From the general report drawn up by Mr. H. D. Melville, Secretary to the Forest Board, we find that the total revenue for the year ending June 30th, 1880, was £6,049 15s. 3d., showing an increase on the previous year's receipts of £1,155 19s. 1d. The timber sales realized £539 10s. 11d., being more than double the amount of the previous year,—and rents for pasturage in the reserves amounted to £5,464 19s. 2d., although the average price is only about 5d. per acre rental for the pasturage—the number of acres leased being about 32,700. The expenditure for the same time was £5,295 2s., being £752 13s. 4d. less than the receipts. This shows good management and a healthy state of matters, which in future years will add largely to the colonial revenue, if the work is carried on in the spirit in which it has begun, and the management is always entrusted to as careful and able hands.

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We are favoured, through the courtesy of the authoress, with a copy of the "Report on Injurious Insects for 1880," by Miss Eleanor A. Ormerod, F.M.S., &c., in which there is much to interest the arboriculturist, and especially all those who cultivate either a farm or a garden.

The season of 1880, being on the whole rather favourable to the healthy and rapid growth of vegetation, the attacks of injurious insects appear, from the details given in these valuable "Observations," to have been less numerous than usual, and to have been chiefly caused by the grub of the Daddy Longlegs, the Carrot Fly, and the Onion Fly. These have done considerable injury to crops in various districts of the country, and the loss inflicted on the community by them alone is greater than can be conceived by any but those who are intimately acquainted with their nature and destructive habits. It would be a saving of many thousands of pounds annually if even these three pests could be effectually stamped out in agricultural districts.

Space does not permit us at present to enter fully into the merits of the many important points discussed in this Report; but we will take an early opportunity to return to the subject, and its bearings upon cultivation, land management, and forestry. In the meantime, we would recommend a careful study of the Report to all our readers who are interested in the success of either of the cultural arts, as they will therein find much information of a valuable and practicable nature, gathered from the long-tried experience of practical men and earnest scientific observers.

# The Valuation and Measurement of Timber and Coppicing.

By ALFRED J. BURROWS, Land Steward, Pluckley, Kent.

Both timber and underwood fluctuate very considerably in price in most localities according as the supply varies or a brisk demand arises for particular kinds. The advantages of good road, rail, or water-carriage are also important factors in the calculation, and the vicinage of mines and manufactories has a marked effect upon pit-prop materials, as well as upon crate-stuff, beech, and alder.

Valuations of the standing timber upon an estate are seldom made except in cases of sales of the land itself, when in order to ascertain the proper reserve price the value of the timber and underwood has to be added to that of the land. Such valuations are generally based upon the current market price at the time the estimate is made; for even though prices may rule low and a rise may be expected, a fall is also within the limits of probability.

In valuing the whole of the timber on an estate considerable allowance must be made for that portion which may be looked upon as purely ornamental, and the removal of which would seriously affect the market value of the property. In such a light we must regard avenue and park timber, which it is customary to set down at half price; for though the worth of the estate may be greatly enhanced by its presence, its removal would injure the property to a far greater extent than the mere market value of the timber itself.

For the purposes of valuation or sale timber is generally classified according to its size as well as its kind. Thus in large sales it is customary to arrange oak under three or more classes. The first may comprise trees containing 40 ft. and upwards, and these in an easily-accessible locality will probably average from 2s. 6d. to 3s. per cubic foot. Next would come those between 25 and 40 ft., which if well grown may be estimated at from 1s. 10d. to 2s. 4d. per foot. Trees containing between 15 and 25 ft. each will probably make on an average 1s. 8d. or 1s. 9d. per ft., and those below that size from 1s. 2d. to 1s. 6d. per ft. Next come the blackrinds, in which class is often included the smaller measurable trees, but mostly those less than 6 in. quarter girth beneath the bark. These have of late years sold at prices ranging from 10d. to 7s. 6d. each, according to size. In making timber valuations it is customary to designate trees under 6 in. diameter as "tillars" or "tellers." When these consist of oak and ash they may be valued as follows:—5 in. quarter girth at 3s. each; 4 in. at 2s.; and under 3 in. at 1s. each. Inferior woods are estimated at proportionately lower prices, and saplings at a certain sum per acre, according to their numbers and kinds.

Ash timber of large size is becoming scarce in many localities, and on this account it commands prices equal to or even above oak of the same dimensions. There is generally much less variation in the prices of large and small ash than in those of oak of the same size on account of its utility even when young. Of late years we have sold large logs of ash at 2s. 8d. and 3s. per ft.

Holly, hornbeam, walnut, yew, and cedar may, on account of their scarcity, be classed together; and a fair average price for these when lying in good situations is from 2s. to 2s. 6d. per foot. Spanish chestnut and lime may be estimated at about 1s. 9d. per foot. Ranging between 1s. and 1s. 6d. per ft., we have larch and elm of good size, willow, maple, and sycamore: at 1s. per foot and under, Scotch pine and spruce, fir, beech, plane, poplar, small elm, horse chestnut, wild cherry, birch, alder and acacia. Beech of large size will, however, make much higher prices than many of the others with which it is classified, and only lately we have seen it quoted at 2s. 6d.

In estimating the value of standing timber upon any large area it may not be necessary to measure each tree separately: sufficient accuracy may be ensured by marking off some blocks in the best, the worst, and the medium growths of a wood and averaging these. But much care in the selection and considerable judgment in taking the averages will be required. Where the trees are all of one kind, or where there is a tolerably regular intermixture, the task will be a comparatively easy one; but where there is great variety it will be necessary to multiply the number of selected blocks. Whenever the size and breadth of a plantation will admit of this, it may be well to select as test-blocks narrow strips running the whole length of the wood and comprising every variety of growth. These may be expected to give the results with even greater accuracy than the selection of square or oblong blocks from the best and the worst parts.

Nothing but extensive practice will enable the timber surveyor to estimate with correctness the contents of trees of large size without a constant use of the rod and strap. But a good eye may by continuous practice become so well trained to the work that all trees coming within ordinary limits of size may by this method be measured with tolerable accuracy. The best method of attaining this ready judgment of the contents of trees is first to take a careful survey of a certain number as they stand in the wood, making entries of their contents, and afterwards verifying the results either upon the standing timber or upon the fallen and rounded trunks and branches as they lie upon the ground. While engaged in this work the whole attention must for the time be concentrated upon it, by which means a few years, practice will do wonders. But even the best judges of the contents of timber trees find it necessary, after being for some time out of practice, to get the eye accustomed to the work by guessing at and then taking measurements of trees when they begin the day's work. Such a method gives confidence.

In measuring timber for the purchaser it is no uncommon thing for the person employed to furnish himself with the most elastic string he can find and the thickest rule he can purchase. Thus equipped he is well prepared to exact from the vendor from one-tenth to one-twelfth more timber than he pays for. But this is a practice which no upright man will sanction on whichever side he is engaged. A much fairer plan, and indeed the only one not liable to abuse, is to use a proper girt-strap, upon which every inch in length is reckoned ¼, and which would therefore be marked ¼, ½, ¾, 1 in., &c., up to 6 ft. or even 12 ft. if the size of the timber to be measured is likely to require this. Upon this strap the proper quarter-girth can be seen at a glance, without any of the delay and trickery to which the use of the string and rule is liable.

For ordinary work in taking heights of trees a pliable ash rod of from 15 to 18 ft. in length will be found the most useful, as this can easily be drawn through the underwood by an assistant, who can also raise it to a height of from 22 to 25 ft., supposing him to be of man's usual stature. Where the timber is of greater height, jointed bamboos are occasionally used, or a light ladder is carried. But both are found inconvenient in practice.

The following table of quarter-girths and contents may easily be committed to memory, and its use will save much of the time taken up in consulting Hoppus or other authorities; besides which it will be available when books are not accessible:—

6 in. quarter-girth will give contents equal to ¼ the entire length in feet.
7 " " " " ⅓ " "
8½ " " " " ½ " "
10 " " " " ⅔ " "
12 " " " " — " "
13 " " " " 1¼ " "
14¾ " " " " 1½ " "
16 " " " " 1¾ " "
17 " " " " 2 " "
19 " " " " 2½ " "
21 " " " " 3 " "
22½ " " " " 3½ " "
24 " " " " 4 " "
27 " " " " 5 " "
29½ " " " " 6 " "
31¾ " " " " 7 " "
34 " " " " 8 " "

Whatever method of measuring timber is adopted,—whether the rod or tape, the eye alone, or both methods combined, it will be necessary to take into consideration and make allowances for all defects arising from decayed and broken branches, and also to ascertain the contents of all branches which have attained timber size. For the purposes of a close valuation large timber will also demand a knowledge of local prices and requirements, the means of access to the nearest markets, the price per foot of cartage, the state of the roads, and the costs of freight either by land or by water.

In valuing the bark upon oak trees we have found the following data fairly reliable:—(1.) A well-grown tree with a good head will yield 6 cwt. of bark for every ton of measurable timber, provided branches down to about an inch in diameter are peeled. (2.) Under ordinary conditions, trees averaging 10 ft. each will yield a ton of bark for every 150 ft. of timber. (3.) Well-grown hedgerow trees sometimes yield nearly a ton of bark to every 3 tons of timber. (4.) Plantation timber varies greatly in its yield. Where the trees stand thick upon the ground the bark will be thin and light, so that about 4½ tons of timber may yield only a ton of bark. But where ample space is allowed between the trees the same weight of bark will be obtained from 4 tons of timber. (5.) Small oak poles averaging 1 ft. each will require 5 tons of timber to 1 ton of bark. Bark varies greatly in weight and quality according to the age of the trees and the situations in which they grow. Long and clean stems with small heads give the smallest yield in proportion to the quantity of timber, and short stems with spreading heads the largest.

In timber measurement a question often arises with regard to the proper allowance to be made for bark, and in practice it is customary to give half-an-inch for oak and elm under one foot girth and an inch for all beyond. Ash and beech require a much smaller allowance and it is impossible to fix upon any one uniform scale which shall meet all circumstances. Trees growing in hedgerows and in exposed places have frequently double the thickness of bark which can be found upon those in adjoining plantations. When well sheltered, trees containing 30 cubic ft. of timber may be found with bark less than half-an-inch thick, while close at hand an exposed tree of smaller growth is covered with bark upwards of an inch in thickness. It is a good plan and a safe guide to occasionally cut through the bark with a scribe and thus ascertain the exact thickness. The following short table from Huckvale's "*Timber, Plantations, and Underwood*" gives the correct geometrical allowance for bark:—

| Thickness of Bark. | Quarter-girth allowance. |
|---|---|
| ¼ inch . . . . . | 0·39 |
| ½ " . . . . . | 0·78 |
| ¾ " . . . . . | 1·18 |

| Thickness of Bark | Quarter-girth allowance. |
|---|---|
| 1 inch | 1·57 |
| 1¼ ,, | 1·96 |
| 1½ ,, | 2·35 |
| 1¾ ,, | 2·75 |
| 2 ,, | 3·14 |
| 2¼ ,, | 3·53 |
| 2½ ,, | 3·92 |

No valuation of timber can be considered to have any claim to accuracy which does not make allowances for the defects to which some kinds of timber growing upon particular soils are liable, especially in cases where such defects have been proved to be common. Local experience alone will enable the valuer to estimate this with anything approaching a certainty, as with the exception of the star-shake, which shows itself upon the outside of the tree in longitudinal ribs of protruding and more recently-formed bark, these defects are generally concealed, or can be ascertained only when the tree is felled and converted.

*Heart-shake*—is a common defect which is found in timber of nearly every kind, though the English elm is the least liable to it. It may be said that most exogenous trees suffer from it, and more particularly Indian teak, Riga and Swedish fir, and the pitch pine of the Southern States of North America. Where it extends, as it often does, two-thirds of the distance from the pith to the bark of the tree the result is, that the concentric layers are entirely separated and form segments of circles. Heart-shake is frequently shown when a tree is crosscut by a straight line going through the pith and extending the greater part of the length of the stem. Sometimes it takes a twisting direction as it ascends the trunk and completely changes its course before reaching the summit. When logs of timber are badly heart-shaken it is impossible to convert them into plank, and they must therefore be used in bulk. This defect is attributed to an unequal balance of the head or of the lower branches, the action of the wind tending to turn the tree upon its axis. Sometimes heart-shakes are doubled, or cross at the centre or pith of the tree, and in bad cases of this kind the trunks split up into four segments.

*Star-shake*—as its name indicates, consists of a series of openings radiating from the centre to the circumference of a tree, and which become more apparent as the tree shrinks in seasoning. We have seen many instances of this in Turkey oak. The cause of star-shake does not appear to be well understood, but it is found to be more common in trees grown upon rocky and sandy soils than in those standing on good clays or in clayey loams.

*Cup-shake*—generally affects trees near the collum, where the concentric layers become separated, probably from frosts and from sudden changes of temperature or from violent storms. In the worst cases it extends throughout the entire length of the tree and even into its branches. Standing timber affords no indication of cup-shake. It is a common defect of the pitch pine of Virginia and of the lignum-vitæ tree. In some of these trees which have been grown upon unsuitable soils semicircular pieces will often come completely out of the converted slab.

The market value of plantations of only a few years' growth is so inconsiderable that it is almost impossible to put a price on them until they arrive at the proper age for their first thinning; but as something must be done in the case of a transfer of the property, it is customary to estimate the cost of preparing and planting the land, including fencing and ditching, draining, ploughing or trenching, plants and planting,—the rent per acre together with rates and taxes from the time of formation, and compound interest on the whole outlay. Until such times as the trees in plantations have attained their full timber size, the present value must to a considerable extent be regulated by the prospective value. To ascertain the latter we must calculate the number of years the trees will take to reach maturity, their probable marketable value at that time and the value of all thinnings and exploitable underwood. From the total sum may then be deducted all outlay with compound interest upon the same, when the balance should indicate present value. As an illustration of a common method of finding present value an actual instance of returns, &c., is given below. The plantation formed part of a large wood, and its extent was 3a. 1r. It occupied a sandy soil worth only a few shillings per acre per annum in pasture. It was planted with larch in 1810, and in the year 1826 it was considered desirable to know the prospective value for 1851. There were upon it 3,311 trees, 1,000 of which were fit for fuel only. From this date the periodical thinnings were executed every five years with the following results:—

| | | | |
|---|---|---|---|
| In the year 1831, 600 trees at 10d. each | = | £25 0 0 | |
| ,, 1836, 560 ,, 1s. 6d. ,, | - | 42 0 0 | |
| ,, 1841, 504 ,, 2s. 6d. ,, | - | 63 0 0 | |
| ,, 1846, 212 ,, 6s. ,, | - | 63 12 0 | |
| Three cuttings of underwood and fuel | - | 6 0 0 | |
| | | £199 12 0 | |
| Left standing in 1851 :— | | | |
| 68 trees, each 30 ft. at 1s. per ft. | = | 102 0 0 | |
| 238 ,, ,, 10s. each | = | 119 0 0 | |
| 129 ,, ,, 6s. 2d. each | = | 40 0 0 | |
| Total amount realized and value of standards in 1851, | | | £460 12 0 |
| Deductions :— | | | |
| Discount on 6 cuttings at three-year intervals | - | £2 2 8 | |
| Do. on £25, amount of 5 years' thinnings | = | 5 8 3 | |
| Do. on £42, ,, 10 years' ,, | = | 16 4 4 | |
| Do. on £63, ,, 15 years' ,, | - | 32 14 0 | |
| Do. on £63 12s. ,, 20 years' ,, | = | 39 16 8 | |
| | | | £96 5 11 |
| Transferable value of Plantation in 1851 | - | | £364 6 1 |

Plantations of larch upon suitable soils both in England and Scotland have been known to realize from £150 to £380 per acre at the time of their clearance, and this exclusive of the value of previous thinnings. And within the last few years falls of larch in Sussex have made as much as £400 per acre. A crop of young larch planted in the proper soil at 18 in. or 2 ft. apart, will in a hop-growing district, and at a flourishing period, make from £80 to £100 per acre at the end of thirteen years' growth. Mixed plantations of larch and Spanish chestnut, in the proportions of 3 to 1, and cut at the age of thirteen years, will also realize nearly equal amounts; and if the chestnuts stand about 3½ or 4 ft. apart, the second cutting of these at the end of another nine or ten years will probably make over £30 per acre.

Valuations of underwood must be based upon the market price of their produce at the time, and this will be influenced mainly by the state of trade in the district, and if in a hop-growing county, by the quantity, quality, and the selling price of the last year's hops. This largely affects the selling price of poles. Thus in 1875, after a succession of good seasons, 14 ft. ash and sweet chestnut poles sold readily at 32s. per 100, while in the spring and summer of 1880 the same class of poles might be purchased at 12s. per 100, and at the present time at even less money. This fall in price rapidly tells upon the wood buyers and through them upon the price of underwood.

Coppicing and underwood have of late years ranged in value from £7 or £8 to £10 or £12 per acre for twelve years' growths upon heavy clay lands such as are found in some parts of the Wealds of Kent and Sussex, to from £35 to £40 per acre for pure chestnut of ten or eleven years' growth upon light sandy lands, and perhaps about two-thirds the above price for ash grown upon a good loamy clay. Even upon some of our peaty soils ash will grow so luxuriantly as to command high prices per acre.

In valuing underwoods it is generally found necessary to measure off a few rods in various parts, afterwards taking account of the number of "stores," as well as "best" and "second" poles, and other produce, if in the western parts of England, or the quantity of "use-poles," 16 ft., 14 ft., and other lengths of hop-poles in Kent, Sussex, &c. But instead of isolated blocks, which may afford no correct criterion of the average growths per acre, it will be best in this case, also, to take some breadths from end to end, such as will comprise growths of various qualities.

In places where very considerable attention is paid to the cutting off of the stools and their proper rounding, as well as to the ditching and planting up, mixed growths of twelve or thirteen years old often make £20 per acre. But in such cases the expense of maintenance is generally high. In all cases of newly-planted coppices their transferable value would be ascertained much in the same way as timber plantations up to the time of their first cutting, after which it is customary to allow a certain price per acre for each year's growth down to the stub, and this is fixed from a calculation founded on the known average values at the time of exploitation.

Some idea of the fluctuations in the price of coppicing and underwood may be formed from the following figures, which are taken from the books of an estate upon which a large acreage is sold annually. The average price obtained in November last was only £7 per acre for mixed underwoods (exclusive of the thinnings of oak), some of which contained large proportions of ash and chestnut poles. Contrast this with the prices of former years. In 1865, when prices were not nearly as high as they were five or six years ago, the weald or low-hill woods of twelve years' growth made £40 8s. per acre, including thinnings, and £25 per acre without them. At the same sale the woods upon the hills realized £41 7s. per acre for eleven years' growth. To give some idea of the produce of these lots, we select a small one of 100 square perches, which sold for £28 2s. 6d. The produce of this lot was booked and sold as under:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 300 | 10 ft. hop-poles | sold at | 6s. | per 100 | =£0 | 18 | 0 |
| 400 | 12 ft. ,, | ,, | 12s. | ,, | = 2 | 8 | 0 |
| 800 | 14 ft. ,, | ,, | 23s. | ,, | = 9 | 4 | 0 |
| 800 | 16 ft. ,, | ,, | 30s. | ,, | = 12 | 0 | 0 |
| 530 | 25 ft. use-poles | ,, | 33s. | ,, | = 8 | 15 | 0 |
| 50 | household faggots | ,, | 20s. | ,, | = 0 | 10 | 0 |
| 400 | brush faggots | ,, | 5s. | ,, | = 1 | 0 | 0 |
| | | | Total | ... | £34 | 15 | 0 |

The whole expense of cutting and working up this lot was £2 10s., thus leaving the purchaser a profit of £4 2s. 6d.

As a contrast to the above we take an instance from the sale in November, 1880. The bad crop of hops and the probability of there being little demand for poles during the winter, told heavily upon the wood sales; consequently prices were very low, though it will be seen that the buyer's profit was a good one. A lot of exactly one acre sold for £8 10s., and worked up into the following materials:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 450 | use-poles | sold at | 18s. 0d. | per 100 | = £4 | 1 | 0 |
| 1000 | 14 ft. hop-poles | ,, | 10s. 0d. | ,, | = 5 | 0 | 0 |
| 850 | 12 ft. ,, | | 5s. 6d. | ,, | = 2 | 6 | 9 |
| 400 | 10 ft. ,, | | 3s. 6d. | ,, | = 0 | 14 | 0 |
| 120 | household faggots | | 20s. 0d. | ,, | = 1 | 4 | 0 |
| 350 | brush faggots | | 4s. 6d. | ,, | = 0 | 15 | 9 |
| Binders, stakes, pea-boughs, and rushes | | | | | = 1 | 4 | 6 |
| | | | | | £15 | 6 | 0 |

The expense of working up this lot was £3 7s. 6d., so that a total profit of £3 8s. 6d. remains to the purchaser.

# The General Work of the Estate.

By ANDREW SLATER, Rose Cottage, Loftus-in-Cleveland.

(*Continued from page* 624.)

### CORRIMONY FENCES.

THESE fences are the most economical fence for sheep and young cattle. The lightness of the material used in their erection, and the facility with which it can be moved to mountainous and other rough sites, qualify them for being used where cheapness combined with efficiency is aimed at.

I have now before me an illustration of A. & J. Main & Co.'s "Corrimony" fence with patent "Leckmelm Vice Grip" Droppers. This fence possesses lightness combined with strength, the "Dropper," with wedges and clips complete for six wires is under 1¼ lb., while, owing to the peculiar section of the iron, it possesses a strength equal to any solid bar dropper of double its weight. Their lightness prevents any injury from wind or undue pressure on the wires when it is found necessary to place the standards at wide distances. In the erection of this fence, the "Droppers" and Vice Grip are put on after the wire has been fixed and strained, and can be removed without disturbing the wires or any other arrangements of the fence.

The wedge and clip fix the "Dropper" to the wire so firmly that it is impossible to move it except by taking out the wedge, and that cannot be done by stock.

The intermediate standards are of flanged iron, and each is supplied with a patent fastener, which is fixed to the standard and one of the wires to keep the standard in its upright position.

Unless the droppers on a fence are made fast to the wires the fence cannot be efficient. It is only the solid web-like property in a fence of that description that will possess the necessary strength to resist any pressure that may be brought to bear against it.

### CONTINUOUS IRON FENCING.

This kind of fence has much to recommend it for enclosing pasture land for heavy stock. If the top bar be of round iron horses and cattle are in no danger of being injured by it, but if of square iron they are apt to be cut by it if by any means they are forced against it. Round iron possesses all the advantages of square iron as a top bar without its dangers.

It is bad management to erect any kind of fence dangerous to stock, such as barbed wire, square iron, stakes with prongs left on, and that for the purpose of scaring stock from them, forgetting that stock may be forced upon them, and seriously hurt or fatally injured.

It is necessary before ordering continuous iron fencing to ascertain the nature of the soil and subsoil. If they are of a loose nature the prongs of the standards will require to be longer than if compact and firm.

During last summer, while in a neighbouring county, I saw a fence of this description. Part of the ground in the line of fence was dry and hard, and part low-lying and soft. On the hard ground the fence had maintained its upright position, but on the low-lying part the fence was swayed at an angle of forty-five degrees, and would soon fall flat by its own weight.

### WOOD FENCES.

Fences of wood are of various forms, some preferring one kind and some another. The first kind of railed fence that I have seen was made of split posts morticed, and split rails 9 ft. long. Two holes were bored for each mortice, and the portion between the holes was cut out with a light axe. Pits, the necessary depth, were made with the spade to receive the posts. It is necessary to beat the earth firmly round the bottom of the post; if that is not attended to, no amount of hammering near the surface will make the post firm, and where the posts become loose the rails will become loose also, and in this kind of fence may slip out. The rails are put in along with the posts as they could not be inserted after the posts are fixed. When the first post of the fence is fixed the rails are then inserted in it. The second post is then slipped on to the rails and fixed in the ground, and so to the end.

Railed fences are now mostly made on the sawmill posts, pointed and driven in the ground with a mallet, and rails 12 ft. long, 4 in. broad, by 1¼ thick if of larch, and 1½ thick if of spruce or Scotch pine.

The most durable posts are of oak and larch. The sapwood of oak is not durable if exposed, and should be slabed off. Oak posts are used on this estate in preference to larch, it is more durable, and a readier sale and a better price can be got for larch than for oak.

Posts 5½ ft. long, 5″ × 3″ driven 22 inches into the ground, that will give a height of 3 ft. 8 in., and if of 4 rails will make a good fence for sheep and cattle.

If young horses are to be pastured, a stronger rail should be placed at the top as they are apt to rub on wood fences. Three rails and 2 wires serve the same purpose as 4 rails.

The posts are placed 6 feet apart from centre to centre. A good way to divide the distances correctly, is to cut a rail exactly 12 ft. long, and then with a hand-saw make a slight draught exactly in the centre on each side of the rail or 6 ft. from each end, when this is done place the rail on the line of the fence to be erected, and with the instrument formerly mentioned make a hole nearly as deep as the post is to be put in the ground opposite each end of the rail. The posts when driven should have their centres exactly opposite the ends of the rail. The third post should be driven opposite the mark in centre of the rail, and so on to the end of the fence.

The top and third rail should be nailed on first, on as many of the posts as are set, and their joints will be on the same posts. Next return to the end and cut a rail in the middle, and nail one half between the top and third rail and the other half between the third rail and the ground. That arrangement will place two joints on each post. The distances between the rails, if for sheep and lambs, should be less at the bottom of the fence than upwards. Distances such as seven inches from the ground, spaces between the rails of six, seven and eight inches will answer the purpose.

Fences of three and two rails are erected in the same way.

The coppice woods in the west of Perth and Stirlingshires are mostly fenced with stakes of peeled oak driven eighteen inches apart, and then are woven with small peeled stuff in the same way as a basket. The weft, as it may be called, is cut about four feet long, that length takes hold of three stakes. It requires a good amount of practise to be able to erect an efficient fence of that description.

These fences are not durable; but they answer the purpose well enough as they are only required to stand seven years at the farthest. The plantations are thereafter pastured by the tenants of the land next adjoining, who have to keep them in repair till the six or seven years have expired.

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**The Deciduous Magnolia.**—In presence of the ruin caused by our recent winters, we were pleased to notice at Sion the other day that the two sturdy trees of the Chinese magnolia were quite uninjured, and bristled with bold flower buds, ready to open in March. What a noble tree this is, and how worthy of our best attention! No doubt our hard springs sometimes disfigure it; but, then, the beauty of the bloom is so fine when the season is at all fair, and the bloom is also so constant, that no trouble is too much to secure the tree a good position. At Sion the tree struck us as being very happily placed, not shaded or approached by others, but with some friendly shelter near; and the alluvial soil of the Thames valley seems to suit it well. The large evergreen magnolia, which forms so noble a tree in the west and south of France as well as in its own native country, is unhappily not nearly so valuable as a standard near London, though it survives here and there. With us it can only be usefully grown as a wall tree, and as such it is often very fine; but for the open there is nothing like the large deciduous magnolia.—*Field.*

# Underwood.

By ROBERT BAXTER, Forester, Dalkeith Park.

Underwood, as the term indicates, is applied to certain species of plants suitable for growing under forest trees. The objects aimed at in planting underwood are generally to produce cover for game, or ornament, and sometimes both combined. I would call attention particularly to the merits of privet, box, holly and yew, as these have been very extensively planted on this estate as underwood for the last fifty years.

Let us look first at privet. In planting this for cover, the greatest care should be taken not to overdo it. If the plantations are young it is absolutely necessary that they should be pruned and thinned regularly; but if the ground is filled up with privet as cover for game, this becomes next to impossible, for if it is let alone for a few years one can scarcely get through it, and it generally has to be cut over every seventh or eighth year in order to get the trees thinned. Now to begin and cut over privet is about one of the most laborious duties that a forester has to undertake: the plants get so interlaced that it is with the greatest difficulty they are cut and separated from each other. When this is done, the privet, as a matter of course, takes three or four years to grow up again. I am perfectly certain, however, that the growing of game coverts, and the rearing of young plantations, may be carried on at the same time without interfering with each other to any great extent. The remedy is simple, namely, to plant the privet in small clumps, instead of filling up the whole ground. There is a double advantage in this arrangement—in the first place the plants are healthier, and grow more compact; and secondly, there is room left for carrying on forest-work. But let us inquire for a moment into the merits of privet cover as a protection for game. So long as the winters keep mild it is very good; but it is almost useless during snow. When planted amongst trees it generally assumes a loose straggling habit, which of course is but a poor protection during a storm. Indeed, I have repeatedly seen great stretches of it levelled to the ground with snow; and when that continued for any time the hares and rabbits commenced to peel the stems and also eat all the young shoots that came within their reach, so that when spring came round many of the plants never rose again.

Then, further, I would call attention to another of its defects which has been showing itself, here at least, during the last five years. In many of our plantations it has been gradually dying out, as great masses of it are found lying rotting in heaps, which have had to be burned. What makes this all the more noticeable is the fact that some clumps of dogwood, planted in the same locality, at the same time, are growing quite vigorously. So long as the plantations were young the privet did well enough, but now when the branches of the trees are meeting overhead, it is disappearing altogether. These facts, I think go to show that it lacks one of the principal requisites of an underwood shrub, viz., that of keeping healthy under the shade of trees. I shall be very glad to hear if this is true of privet generally throughout the country, or if it is confined to this place in particular.

There is this to be said in its favour, however, that there is nothing better for planting on steep slopes than privet; if you can manage to get a few plants in, they soon layer themselves and cover a large space in a few years, and if they have plenty of light and air they form a cover which neither man nor dog can go through.

*Box.*—There are about 10 acres of the tree-box on this estate, and it forms a very pretty underwood. I find that it thrives under the densest shade of deciduous trees. We have it growing fresh and green in a mixed plantation of oak, Spanish chestnut, and spruce. Another recommendation is its dwarf habit; although planted fifty years ago there are none of the plants more than 8 ft. high. Where it is an object therefore not to conceal the trunks of trees, or preserve good ventilation, the box is admirably suited for both purposes. Hares and rabbits have also an aversion to it, as I have never seen a single instance of a stem being peeled, or a branch eaten by them. Then last, though not least, here the woodland songsters in spring-time find in a box bush a snug corner for their nests, and in winter a shelter from the cold. The best plants are found growing on a light loamy soil, and it will be found as a rule that the lightest soil is most suitable for them. Great care should be taken not to plant box too thickly, for the plants soon get top-heavy and fall to the ground with their own weight. Indeed, we do not know any plant that suffers more from overcrowding than box. If it gets room it will grow shapely and compact, but if otherwise you only produce tufted canes. Many of the plants growing here are 9 ft. in diameter to the tips of the branches. These, however, are principally on the outside of the plantation; in the centre they average about 5 ft. In planting it, therefore, on suitable soil, 10 ft. apart will be found a good average distance. It is also well adapted for transplanting, as it forms almost a solid mass of matted roots which hold the ball well together. Plants 6 and 8 ft. high may be shifted with perfect safety, if attention is paid to watering carefully. In the month of July last we shifted 250 plants, averaging 6 ft. in height, and in going through amongst them this afternoon found them looking well. I intend to continue the watering, however, throughout the coming spring and summer. Next to holly the box is most effective for decorative purposes, and it is well to know that it can stand a good deal of cutting with the knife, and will even spring away freely from the ground when cut over. Not many years ago, evergreens were given away in handfuls, but now they are sought for by the ton, for which new industry I suppose we have to thank our friends on the south of the Tweed. The wood of the box stands unrivalled for turnery purposes, its hardness and closeness of texture enabling the turner to produce a sharpness of outline and brilliancy of polish which cannot be obtained from any other wood. It is also highly prized by the wood engraver, and such has been the increasing demand for it in this department, that grave fears are entertained of it being entirely used up. At the present time experiments are being tried with other woods as a substitute for it; but as yet nothing has been found approaching to it in quality. There is an annual import of between 2,000 and 3,000 tons of it to this country. The finest quality comes from Odessa, Constantinople, and Smyrna. We cannot close this short notice of the box without noticing how well suited it is also for planting out singly for ornamental effect. If placed in a roomy situation it will stand for a generation without requiring either to be cut back or pruned into shape. In the dead of winter the eye cannot rest on a more pleasing object than its compact glossy foliage. In the spring, also, a very pretty effect can be produced by planting either the red or white *Ribes* near it, their light pendant flowers being shown to great advantage against the dark green background.

(*To be continued.*)

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**IMPROVEMENTS AT SUNDERLAND.**—Messrs. Little and Ballantyne, Knowefield Nurseries, Carlisle, have been appointed by the Town Council of Sunderland to carry out the formation of the grounds and planting, also the rockwork and waterfalls at West Burn Fields Park and Recreation Ground. The work will proceed under the direction of their landscape superintendent, Mr. F. Spirey.

**FRUIT TREES IN BOHEMIA.**—According to recently-published statistics, the number of fruit trees in Bohemia of all sorts, but chiefly apples, appears to be 14,000,000. Of these 10,000,000 are in gardens, 1,600,000 in waste lands, and about 2,000,000 on the sides of the public roads. The number of young trees annually planted is about 1,500,000. Between 6,000 and 7,000 miles of road are planted with fruit trees, mostly of the best sorts, and the revenue therefrom is very large. The fruit is largely exported to the North of Germany and Russia.

# Pruning of Forest Trees.

By C. Y. MICHIE, Forester, Cullen House, Cullen, Banffshire.

Various and conflicting opinions are held respecting the art and practice of pruning forest trees, and it may be advisable, before entering upon details of the subject, to consider the practice as it now generally prevails. Much light has of late years been thrown upon the art and practice of pruning, and science has done much to dispel the haze which once surrounded it, standing, as she ever does, with eyes open and hands outstretched, to observe and assist the various operations of nature. To those who follow the light of true science, the art of pruning is clear and comprehensible; while to those who do not, the art is necessarily obscure, and the views respecting it are as varied as the sources of enlightenment from whence they are derived.

Some practise and recommend a system of regularly and uniformly shortening all the side branches to within a few feet or even inches of the trunk. This, they affirm, is highly favourable to the healthy development of the tree, by producing fresh spray and healthy foliage. Others can see no utility in the practice of pruning at all, beyond merely clearing the trunk of the tree to about one-third to one-half its entire height of all lateral branches, allowing it in all other respects to remain as it happens to grow. Others, again, practise a system somewhat allied to pollarding, as done in woods grown exclusively for fuel. This is performed by cutting off all the boughs close to the trunk, leaving only a tuft of branches shortened slightly on the top. The object of this, they say, is to accommodate a greater number of trees upon a smaller space of ground, and at the same time to preserve a tall clean trunk. Others, yet again, which include by far the greatest number of those who practise pruning at all, prune sometimes right and sometimes wrong, but at random all the same.

A knowledge of vegetable physiology, and of the laws generally that regulate the growth and health of plants, is as essential to the man who practises pruning, as a knowledge of anatomy to the surgeon who amputates a limb from the human body. No definite rule or rigid law can well be laid down for pruning, as applicable to every case with unerring certainty and success; therefore the only true way to arrive at perfection in the art is to examine thoroughly into the true nature of the laws and principles that regulate the healthy development of plants in all cases, conditions, and circumstances. Professor Lindley says:—"The object of the pruner is to diminish the number of leaves and branches, whence it may be understood how delicate are the operations he has to practise, and how thorough a knowledge he ought to possess of all the laws which regulate the action of the organs of vegetation. If well directed, pruning is one of the most useful, and if ill directed, it is one of the most mischievous operations that can take place in forests."

Again, the same author says:—"Pruning may be regarded as a necessary evil to which the wise must submit because of the ignorant, the careful to cure the evils inflicted by the careless." The substance of the doctor's remarks would do well to be engraven upon every pruning-knife, and kept constantly before the eyes of the operator. I apprehend it will be seen from the foregoing remarks that one of the chief, if not the only cause, of the difference of opinion that exists in regard to pruning, arises out of a misapprehension of the principles upon which it should be performed. I would strongly recommend those who doubt the efficacy of pruning to become their own judges of the art. Let them examine plantations where judicious pruning has been performed, and compare them with plantations that have either been improperly pruned, or not pruned at all, and by these means they will be more readily and fully convinced than by any amount of abstract reasoning or advice that can be given.

For the sake of those who may wish to obtain a sound and correct knowledge of the principles and practice of pruning, I subjoin the following examples at some length:—First, as applicable to hardwood trees; and second, as applicable to pines; specifying, however, only as many examples as may be deemed sufficient to illustrate the subject. The first case, where pruning may be considered necessary, is that of a hardwood tree on its being transplanted from the nursery to the forest, from a rich to a poor soil, from a clay to a dry loam, from a sheltered to an exposed situation; or from a tree having had the bark injured or gnawed off by animals; or having become otherwise injured so as to cause it to die down to near the surface of the ground; and, on the top having become dead, which latter circumstance frequently takes place in large trees, particularly if removed from a damp to a dry soil or imperfectly rooted previous to transplanting. In this case, the only sure means for recovery or restoration of the tree is to cut it over. In small plants I cut to within an inch of the ground's surface, and the part cut off is pruned of the small branches, sharpened and stuck into the ground close by the side of the stool from which it was cut off; this forms a future mark for the pruner when he goes over the stools in June or July to clear away all superfluous shoots, leaving only the strongest and straightest one on each stool to form the future tree.

With regard to trees of more advanced growth, whose tops have decayed, I cut off only the dead part back to where the stem is vital and healthy, allowing a leader to start anew from the stem. This we often find of advantage where cattle or other animals would be likely to destroy the leader if within their reach.

In transplanting large trees for ornamental purposes, I generally cut a portion off the top, or reduce the number of the large branches, which not only lightens the top of the tree, and prevents the wind from having an injurious effect upon it, but causes indirectly a larger quantity of sap to ascend into what remains of the branches and top thus newly produced.

The next case is that of a tree at various periods of its growth, from a sapling upwards, that has branched off into two or more stems. This occurs both when the tree is of spontaneous growth, and also when it has been transplanted, but it must be admitted that it occurs more frequently in the latter than in the former. When this occurs only with saplings, it may appear a matter of small importance, but it is far otherwise in the case of a tree when it has attained any considerable size; thus, not only is the foliage deficient on the inner side of the two branches confronting each other, but the tree in consequence of the diminution of branches is correspondingly injured in its roots. A tree in this form also occupies an undue extent of surface of ground, and instead of becoming a symmetrical, beautiful object, with a solid massive trunk, alike valuable and beautiful, develops itself into a number of limbs and branches, radiating it may be from two or more large ones, neither a good subject for the artist nor useful to the mechanic. Nor is this the only evil that may arise from tolerating such a tendency in the growth of trees to go on unchecked, for it must be borne in mind that the roots of trees bear an approximate proportion to the branches, that the two run usually in the same direction parallel to each other, the one above and the other beneath the soil, so that in such cases the roots occupy as undue a portion of the ground underneath as the branches do of space above. Another consequence of the above result is, that the half of a tree which is unfavourably exposed to the prevailing hurricane is often blown down, and the remaining half shares a similar fate when the wind blows from the opposite quarter. As a remedy, therefore, against this evil timely pruning is what is required. In operating upon a sapling, I cut off at once the branch close to the bole of the tree, but if the limb or branch be too large in proportion to the tree, to admit of being cut off at once, I shorten it by degrees till sufficiently small to admit of being cut clean off. Not only is the proportionate size of the branch to be taken into account, but the state of the tree's health at the time must be considered and studied, together with the situation in which it is growing.

These constitute some of the principal features to guide us in deciding whether the branches are to be reduced by degrees or cut off at once clean to the stem.

When a tree divides into a double top, at a height below what constitutes a good trunk or stem, I lighten one of the tops by cutting off about one-third of its entire length—that is, if the annual growths are large, the top much drawn up, and with few lateral branches upon it, but if the annual growths are comparatively short, say from 12 to 15 in. in length, and fully furnished with lateral twigs, we at once cut away close to the leading stem the less favourable-looking shoot of the two, and in general the one that would be most likely to be broken off by the prevailing winds in the locality. Pruning in this case is generally performed by means of the pruning chisel, which is used to great advantage upon trees when beyond a man's reach. The chisel which is made with a socket is fastened upon a long handle by means of a screw-nail. The handle may be of any convenient length, from 8 to 20 ft., or upwards. The handle of the chisel, when sharply struck with a wooden mallet made of very hard wood, will cut even a large branch at a single stroke; and if the handle is perfectly straight, and fills the socket completely, the length of the handle does not diminish the force of the blow in any important degree.

It frequently happens that a tree, from some accident or other, loses its leading top at an early age; the consequence is, that a number of branches strike off in a horizontal direction, but none of them take an upright position, and this renders the tree quite a shrub of a somewhat pendulous and spreading appearance. A tree in this state would probably ever remain a mere arboret, or bush, if left to itself. In this case, when hares and rabbits are not to be feared, I at once cut over the tree to within an inch or so of the ground. A young tree is thus allowed to form; and though the tree at the time it is cut over may be 6 or 8 ft. high, yet in two or three years afterwards (if the tree is healthy) a young sapling will have taken its place, which, though not so strong, will be nearly, if not quite, as tall as the original tree, more healthy, more handsome, and better directed in its upward growth. A tree when once fairly established in the ground will, the first year when cut over, produce strong and vigorous shoots. From this the most promising shoot is selected for the future tree, choosing always that one which is lowest down upon the stool. If, however, as is frequently the case, hares or rabbits are to be dreaded, I cut the tree over at a point above their reach, and immediately below where a year's growth terminates, and where some branches exist. In cutting over close to a collection of spray or small branches, the sap is attracted to them, and the newly formed leading shoot is thus supported and developed. A very common occurrence in this case is, that a quantity of spray is formed immediately below the cut part, particularly if the tree is at all unhealthy or of stunted growth. Trees thus operated upon in the winter and spring should always be gone over in the succeeding June or July, and all superfluous shoots broken off with the hand, which is better than the knife in ordinary cases; and when the woods are clear of game, I prefer adopting the former system, but when the reverse of this is the case I adopt the latter, as the young shoots become at once a prey to hares, rabbits, and deer, and are seldom allowed to make a start over one year's growth, as the wood formed in the summer is utterly destroyed during the succeeding winter.

This kind of pruning is seldom necessary except in high and exposed situations; but under such circumstances I have often adopted it with the greatest success.

Another subject for pruning is, where a branch grows off from the main trunk of a tree at an acute angle, causing the bark to fester at the point of junction of the two surfaces. Trees thus affected become almost worthless for shipbuilding and other purposes where good sound timber is required. True it is that oaks of the best varieties are seldom affected with acute-angled branches, yet they are occasionally so—even the *Quercus robur* whose branches generally go off at almost right angles, is, in some cases, so affected. Since then we find nature producing branches of this description upon trees—and trees thus grown are ultimately almost useless for shipbuilding purposes, at least, unless timeously denuded by pruning—art must, therefore, step in and take nature by the hand, and guide her forward in the path most conducive to the convenience and interests of man; and in no instance can she do so more certainly, and with better success, than in cases such as the above. While the young sapling is within reach of the hand, I use only the common pruning-knife, but when above reach, the pruning chisel must be used; and in doing so, I proceed in one of two ways—viz., when the branch to be operated upon is situated upon a tree of rapid top growth—that is, when the leading shoot is long and slightly drawn up, with comparatively few branches, I reduce the branch by cutting it back to about one-third of its entire length; on the contrary, when the tree is tolerably strong in proportion to its length, and is fully developed in its lateral branches, I cut off the branch close to the trunk at once. The object of this department of pruning is to obviate the consequences of the bark growing into the body of the tree, and to prevent high winds from splitting off the limbs at any future period of its growth, and also the injury that frequently occurs from the lodgment of heavy falls of snow upon the tree.

Another case for pruning is that of branches having become dead upon a tree. So long as the branches are vital, they are in a state of growth and enlargement, forming woody layers along with, and in some proportion to, that of the trunk of the tree, from whence they issue; but as soon as life ceases in the branch, the annual layers of wood upon the trunk, by continuing to increase gradually, encloses the base of the dead branch attached to it, and which, as it becomes enveloped in the wood upon the trunk, forms the much-complained-of black knot. If this occurs in a young tree, while the branch is a comparative twig without heart-wood it soon decays and falls off, and no serious consequence arises from it, but when a large branch dies upon a tree after the heart-wood is formed in it, an evil of no small magnitude is incurred. The dead branch in this state remains upon the tree for many years, and until embedded several inches in the trunk by the increased annual layers upon it. The consequence is that when the tree is sawn into boards, a black knot is frequently found to go right through it, and on the wood being seasoned it frequently falls out, thus leaving a hole in the board, and rendering it useless for many purposes. Therefore, in all cases in young growing woods and plantations, I at once prune off all decayed branches from the main body of the tree. In pruning off dead wood from young trees, I use only the pruning-knife or chisel; but when the trees are aged, and the heart-wood formed in the branches, the operation is performed by means of a ladder, hand-saw, and spoke-shave. With the latter instrument carefully smooth over the surface of the knot where the branch existed, clearing away all decayed matter around the part where the bark does not cover. I then paint over the dressed knot, in order to prevent decay in the tree, to protect it till the bark covers it quite over, and to bring the knot to the natural colour of the bark of the tree. White lead mixed with oil, a little lampblack and red ochre, serves in most cases for this purpose, and may be mixed to any required tint. The most efficient preservative against decay in trees is an application of Archangel tar. For trees of a dark-coloured bark I prefer tar mixed with oil or grease to oil-paint, taking care to apply it sparingly in hot weather, as it is apt to run and spread if laid on thickly. White lead alone is often most like the lichen upon the bark of old trees, and for any conspicuous part it may be made an excellent imitation. I do not recommend the practice of taking off dead limbs or large branches from old ornamental trees; such treatment may be regarded as a needless interference with nature. Just as proper and natural to pluck the silvery locks from an old man's beard, to improve his look, as to remove the romantic and picturesque arms from an old tree, particularly the "brave old oak," whose venerable age has won him renown.

It frequently happens with trees standing singly, by removal of others from them, that at some particular part upon the stem an undue number of branches are developed, and, in consequence of this, that part of the trunk immediately beneath becomes disproportionately thick in comparison with the part above where the branches occur. The sap is thus in a great measure obstructed in its ascent to the uppermost branches, and the top of the tree is cut off from its due means of support and enlargement. In order, therefore, to guide the sap in a proper direction up the tree, this profusion of branches must be diminished. In doing so, I cut a few of the small branches clean off close to the stem, and reduce the larger ones about one-third of their entire original length, taking care in all cases of shortening to cut close above another branch or small twig growing upon it, in order to preserve the branch alive, and also to conceal the cut part. In pruning within policy grounds, or in sight of carriage-drives, considerable art is required, so as to conceal from view the wounds inflicted upon the tree. When above the level of the eye, it is necessary to cut on the concealed side of the branch, and, in general, so as to be least observable. In a very important sense, pruning ought to be performed as a species of pilfering, and the concealment of it regarded as true art.

The case applies principally to young trees, and the object to be attained is their proportionate development, as a remedy against undue enlargement of the tree below the mass of branches, by diminishing which the sap is induced *indirectly* to ascend so as to nourish and enlarge the more slender part of the tree above. It is frequently indispensable to have planks of timber from trees which have a clear, straight, and tall trunk, free from knots and clear of all lateral branches to a considerable height; and in order to attain this in the most perfect way, the trees should be grown only at such distances apart as sufficiently to check the side branches when young, and a few trees gradually thinned out at a time; but this practice, from reasons well-known, is often found impracticable. The only alternative, therefore, is to assist nature in clearing the bole of the tree of all lateral branches. It is often difficult to say what the truly natural habit of trees is, as soil, climate, and situation have each a powerful influence in altering their appearances, and even their qualities. We find that when trees are grown singly, and are fully and openly exposed to sun and air, they are in most instances clothed with branches from near the surface of the ground to the top, so that the aid of art is called in to assist in producing a clean, tall, handsome, and useful tree. Pruning in this case might be almost, if not altogether, rendered unnecessary by timely and judicious thinning; yet, as already stated, this in the general management of woods is found impracticable, and consequently pruning is rendered a necessary operation. The operation of clearing the bole of a tree is the simplest of all departments of pruning, and is performed upon young trees with the pruning-knife; but in the case of tall trees and those further advanced, the pruning-chisel is employed. As a general rule, the trunk of the tree is kept clear of branches to about one-third of its entire height: thus, a tree 30 ft. in height should have a clear trunk of 10 ft. and a tree 60 ft. high a trunk clear to 20 ft. In low-lying sheltered situations, where the soil is deep, the trunk of the tree may be cleared to nearly half its entire height. Though this is the simplest process of pruning, yet it is in many cases sadly abused by clearing the tree of its branches too near the top, and also by doing the work roughly. It is often necessary, although not desirable, to prune trees in hedges, and along avenues, rides, carriage-drives, and roadsides, not with the object of benefiting the tree, but only to check the growth of the branches, and prevent them from unduly hanging over, thus shading surrounding crops, and impeding traffic over the roads. In this case the principal attention and observation required is to lop off the offending branches without imparting to the tree a mutilated or manufactured appearance, to cut each branch so as to leave the part remaining upon the tree in a state sufficient to elaborate the sap and maintain vitality in, and impart nourishment to the tree. In the operation itself, sometimes the saw and spoke-shave, and sometimes the pruning-chisel is used, but in either case the greatest skill is required in amputating the branches in such a manner as to be almost if not altogether unobserved. In this department of pruning no positive definite rule can be laid down as applicable to all cases, as the entire execution of the work depends on the taste and skill of the operator. I always cut either close to the trunk of the tree, and dress and paint the knot so as to avoid observation, or cut at such a distance from it as to secure and maintain vitality in the branch, and preserve the symmetry and outline of the tree. In amputating a large limb, I always endeavour to do so within an inch or so of a smaller branch, and thus many a noble tree is preserved from falling a victim to the woodman's axe, or being subjected to a tortuous mutilation. It is remarkable how proprietors of cultivated minds and refined taste can tolerate the unskilful and distasteful manner in which handsome and often noble trees are so outrageously disfigured by unscientific and inartistic pruning. But, as already remarked, this instance of pruning is not performed with a view to improve or benefit the tree, but simply for other, yet very important, reasons.

In the case of one large branch, or a number of branches, growing upon one side of a tree, such branch or branches, from being disproportionately large, attract an undue amount of nourishment to themselves; thus a tendency is created to overbalance the tree by an excessive weight of branches and foliage on that side. A tree thus unequally balanced increases in woody matter on the side to which it inclines, and this evil is increased twofold; as the tree advances, it extends and establishes its roots most upon that side upon which the greatest number of weighty branches are situated. The seemingly unimportant circumstance, which commenced in a disproportionately large branch, soon becomes magnified to such an extent as to terminate in very mischievous results. A reclining tree occupies several times the space that an upright one does. It is more subject to be loaded and broken down with snow, it is unequally rooted, being deficient upon that side where fewest branches are situated, and, consequently, more subject to be blown down with winds, the annual layers of wood being much thicker upon the under than upon the upper side of the tree. The timber manufactured from such trees twists and warps in such a manner as to render it useless for many important purposes, hence the necessity of pruning in order to properly balance the tree.

It sometimes happens that, from the weight of fruit or foliage upon a horizontal branch, from lodgment of snow, or some other cause, a bough or limb is so bowed down as to rest upon another below it, and from the friction of the wind, the two branches are rubbed upon each other, often producing irritating unnatural sounds, mutually disfiguring each other by friction, destroying the foliage of the branch, upon which the upper one rests, which, from an undue weight upon it, also presently gives way. During heavy falls of snow, I have seen many noble trees thus all but totally destroyed, which, by attention to the removal of such branches in due time, might have been entirely prevented.

The oak, which generally stands first in the order of hard-wood trees, and that pruning most benefits, may, at some period of its growth, come under one or other of the cases of pruning already laid down. One individual tree will, however, seldom or never embrace more than one or two of the instances cited. When each case has been carefully studied and understood, any intelligent person will perceive at once which of them applies to the subject under operation. What applies to the oak is applicable to the ash, elm, beech, lime, sweet chestnut, and mountain ash—that is, any one of them may be pruned at any period of the year, except in cases when the plants require to be cut over close to the surface of the ground, in such cases I prefer doing the work during April or May; because if a plant is cut over late in summer or early in winter, it is so long exposed to the wet as materially to retard, if not entirely to prevent vegetation. The sycamore, maple, birch, walnut, &c., I prefer pruning during the months of June, July and August, when the tree is in full leaf, and the solar heat has the greatest influence. The walnut in particular should only be pruned when in full leaf, and at no other time, and if any considerable sized branch is cut off, at any other season of the year, it will certainly prove not only an offensive nuisance, if in a garden or pleasure-ground, by the sap dropping upon the walks or grass, but also very hurtful to the tree. If, however, it is done in July or August, no serious consequences need be feared, even in lopping off a limb of considerable size. The sun, during this season of the year, produces also a hardening effect upon the newly inflicted wounds, which by this means are sooner healed, and the bark then more quickly covers the wounds than if pruned at any other season of the year. In order to test the effect of so doing, I have pruned sycamore and birch during December, and have found them bleeding from the wounds during the succeeding April and May. I have never found any injurious results from pruning during summer and early in autumn.

At that season of the year when the cambium is changing into alburnum, there is least danger of spray being produced from the wounds, and equally of the tree bleeding.

*Pine Pruning.*—Assuming that the principles upon which proper pruning should be conducted are laid down sufficiently plain in the foregoing statements as applicable to hard-wood trees, I need only add a few remarks upon that other branch of the subject, viz., pine pruning. In consequence of the difference of the growth, constitution, and nature of the pine compared with that of hard-wood trees generally, pruning coniferæ is rendered a practice much more difficult, and in most cases more or less hurtful. It is upon consideration of this delicacy alone, and not from the habits or development of the trees outwardly, that pruning coniferæ is so essentially different, and opposed to the pruning of hard-wood trees. When we take into consideration the difference of the ingredients of the fluids of trees—such as gum, sugar, turpentine, resin, &c.—it is not matter of surprise that pruning should produce such varied and opposite effects, nor is this more evident in any instance than it is by artificially exciting the growth of pines, and thus deranging the natural course of the fluids; and it is immaterial whether the subjects operated upon are transplanted trees or those of spontaneous growth, the results in either case are much the same.

Artificial manures, undue richness of soil, excessive moisture, and pruning, each produce results to the pine hurtful in their way. In a brief account of pruning such as this, it would be out of place to enter minutely into details upon the crystallizing process which the fluids of pines undergo on being disorganized or deranged in their functions, I will, therefore, simply state the effects that have been produced on pine trees pruned under various conditions and in different ways.

First.—I have found pruning of very decided advantage to pine trees below fifteen years of age in the way of relieving them of double stems or tops. The advantage gained to the pine tree is similar to that gained to hard wood in relieving the double top; I consider this the most beneficial of all pruning applicable to pines, and of all others is most frequently called into requisition, especially for silver fir (*Pinus picea*), as this tree is very liable to grow double, which is very hurtful and deteriorating.

Second.—A case in which pruning is of advantage to pines, is in pruning off the dead-wood. From the circumstance of this tribe being planted closely together in masses and groups, to become most useful for the purposes of industry and art, the growths of the lateral branches are soon so much checked as to cause them to wither and die, and in this decayed state they will remain upon the tree for several years. The trunk of the tree meanwhile enlarging, the dead branches become covered over with the annual layers of wood, and thus black knots are formed; and when boards are sawn out of trees thus affected, the knots in the boards, when they are seasoned, drop out, leaving a hole through them as if cut out with an auger. When the dead branches, however, are removed from the trees immediately on becoming decayed, the lesser of two evils is the result, viz., a dark spot instead of a hole, which may in most cases be regarded as of small importance, except in very thin deals, when they may partially appear on both sides. Pruning, therefore, under such circumstances, is of very decided advantage to pine timber.

Third.—Another system is pursued in the treatment of coniferæ, viz., that of pointing or shortening the side branches, in order to promote the top growth of the tree. I have made several experiments of this kind of pruning in order to satisfy myself on the point, and the result of the experience is to convince me of its inutility to accomplish the object in view, irrespective of its impracticability in the forest. We have, on various occasions, headed back the side branches of trees growing up side by side with others which had not been pruned, and, at the expiration of four or five years, on comparing their respective growths, have found that the trees which were not pruned had made growths equal in length, and rather stronger than those which were operated upon. However, if for any special reason apart from economy and utility, it is desirable to check the side growth of pines, I would, in every case, pinch off with the hand the buds or young shoots.

Fourth.—Any pruning performed upon the branches of coniferæ should be done during September or October, as during these months the fluids are in a more fixed state, and are not disposed to ooze out so freely as earlier in the season; and if deferred till winter, a greater portion of it would become decomposed before the bark covers over the wound than if the operation had been performed in autumn.

As regards the pruning off dead-wood, the case is materially different, no wound being thereby inflicted in the vital part of the tree, and, consequently, the fluids remain undisturbed. One reason, however, for pruning off dead-wood in spring and during summer, instead of during the colder months of the year, is in consequence of the tendency it has of lowering the temperature of the plantation; dead-wooding produces that effect more completely than any moderate degree of thinning could do. The benefit, however, arising from pruning off decayed branches from pine and fir timber is so great, compared with the evils that can possibly arise from it, that in all cases, when practicable, it should be adopted.

In several instances I have headed back pine trees under twelve years of age. In some cases where the top had been injured, I headed them back with a view to induce a fresh leader to form, and in other cases I have headed them back, in order merely to observe the result; and in every case, within a few years, symptoms more or less unfavourable made their appearance. The top, in some cases died back the second year to where it had been cut over, and, in other cases, the trees either lost much of their previous vigour of growth, or became covered over in their stems and branches with resinous globules. I headed back some larches, by cutting off two or three years' top growth, when the trees were about six years planted. The trees were growing at an altitude of about 600 ft., and the top shoots were about 18 in. in length. This was done with a view of testing the effects upon the trees; when within four years from the time of the operation, there was a decidedly visible superiority of growth upon them compared with those that had not been cut. Nothing is to be gained in the end by top-cutting of larch, but, on the contrary, considerable loss and risk; hence, it should not be practised. It is further suggested in reference to pruning, that no branch be cut from a tree that is not doing positive harm or injury to it, and that every branch is a source of nourishment to the tree, and every leaf a medium through which the tree is supplied with the elements which nourish it.

Spray or young shoots formed after cutting off branches of hardwood, though vigorous and healthy at first, will, unless the tree is in a very vigorous state of growth, wholly or partly die or grow sickly, the second or third year, and the once broad healthy leaves, which pruning was the cause of producing, become only a poisonous provocation to the plant.

Diminishing the number of branches upon a tree is an indirect way of preventing it from procuring food for its support and development. Let no decayed limbs or horns be removed from very aged trees unless broken or otherwise disfigured, but let damaged live branches be removed in every instance. No pruning can be considered practical and efficient that does not interpret and clearly explain itself, and no person is capable of judiciously pruning who cannot give a good and intelligent reason for so doing, by explaining it, if not in scientific terms, at least in a manner agreeable to science and common sense.

## BLENHEIM PARK.

This historical park is fourteen miles in circumference, contains 3,000 acres, and varies in formation from perfectly level ground to that which is deeply undulated; the soil, a moderately stiff loam, lies on limestone. The planting of lines, groups, and belts of trees is simply perfection. It seems as if the artist ("Capability" Brown) had studied intimately every detail of his picture before commencing it. One thing, at least, he evidently did consider, and that was the large space with which he had to deal, giving breadth of turf and large or small tree groups or single specimens as they best befitted the positions they were to occupy. The result is an unrivalled piece of landscape scenery—grand, first of all, for its extent, and next for its natural artistic effects. The variety of trees used in the park is somewhat restricted. Oaks predominate, and of these there are many extra fine specimens, ranging in girth of bole at 4 ft. from the ground from 25 ft. to 35 ft.; many of them have, however, seen their best days, but are so handsome in their decrepitude, that it would be an act of vandalism to cut them down. Elm and beech have been largely planted, some of the former towering to a height of 100 ft., and the latter developing every variety of habit of growth, from dwarf, compact, erect-branched trees to those that are tall and pendulous. As evergreens, common, black, and silver spruce firs predominate, but the kind of all others that, as it were, gives the finishing touches to the picture is the cedar of Lebanon. Some groups of this cedar on the banks of the lake opposite the north front of the palace are indescribably beautiful; the trunks range in girth from 20 ft. to 30 ft., and several of the trees measure over 100 ft. from outside to outside of the branches, and, as in the case of beech, there is a greater variety of form in the cedars growing here than we had ever imagined could be the case. Some trees are perfectly cone-shaped and formal; others flat, sending out boughs in true horizontal lines; whilst others have a drooping habit. The effect produced by these noble trees is considerably heightened by the position they occupy, namely, the banks of a most naturally formed lake of more than 250 acres in extent. The appearance of this lake, combined with the undulating character of the ground in this part of the park, as seen on emerging through the archway that forms the Woodstock entrance, is very beautiful.—*Garden.*

# Isolated Trees in Parks and on Lawns.

BY D. T. FISH, HARDWICKE, BURY ST. EDMUNDS.

THESE are seldom healthy or effective. The fact is, few trees are strong enough to stand alone, either constitutionally or artistically. Trees are naturally gregarious, not solitary. The one tree becomes many—a wood or forest, in virtue of its seeds scattered from its outer branches reaching, rooting, and growing in the maiden soil. Thus, like fairy rings in the fungoid world, the forest grows wider and yet wider, until islands — continents, become wooded. The isolated or dot planter forgets all this. He sets his solitary plant in the teeth of all the winds that blow, and expects it to grow up into a comely, a noble tree or specimen. Very often his over-impatience leads him to take a false step at starting; anxious for the immediate effect, he goes into a well-sheltered wood or plantation, and selects from thence the best formed, tallest tree he can find. He carefully lifts it with most of its roots intact, and sets it down in the solitary place he has provided for it. No sooner is it planted than it begins to sulk, and pines for the warm companionship of the trees it has left behind. It stops stock still, or goes backward for years, then dies outright, or makes a rush into growth, and does fairly well, but seldom or never grows into a good specimen. In fact, it is almost impossible that it should. Let any one in a March day when the east wind almost curdles his breath, pass from the open field or lawn into a belt or wood, and mark the difference. It is like passing, in a moment, from December to June. Let no one say, who has not tested the matter for himself, that this is an exaggeration. I have done so many a time, and hardly any words can be found sufficiently strong to describe all the difference between in and out of the wood. Only last year in a bleak open country, I had occasion to pass over a field into a belt of larch and spruce about 15 feet high. The change of temperature and feeling were so great as to be incredible to those who have never tested the amount of shelter afforded by even young trees. Those who will persist in planting single trees here and there in parks or on lawns should either choose their young plants from the most exposed places, or sow seeds on the spot where they expect their great specimens to rise. They would save time as well as much disappointment by doing so. But even then the growth of the trees will be slow, for it is not good for trees to stand or grow alone.

Neither is it artistic. Of all the commonplace prosy places to be found in the world, go wander in an arboretum or pinetum planted in the isolated dotted single-tree fashion. If the specimens were rare and tolerably healthy, their rarity and beauty might so far absorb the lover of trees as to divert his attention from the obvious faults of this mode of planting. With the finest possible material no one, however gifted, can form a beautiful landscape with single trees; it is as hopeless as for a painter to attempt to make a beautiful picture with round dots; colour them as he might, diversify and alter their size to infinity, they would still remain dots. It is very much the same with isolated trees. It is as impossible to form beautiful groups, or flowing lines of grace and beauty of them as to make them grow freely. Their isolation stiffens them into ugliness just as it stunts them into dwarfishness or twists them into deformity. It is therefore high time, alike on cultural and artistic grounds, to demand a more rational treatment of trees in parks or lawns and in pinetums.

Without endangering botanical arrangements or hindering the growth of single specimens, it is surely possible so to group trees into masses as to foster their growths and add to the breadth and grandeur of their effects. Artistic grouping need not lead to overcrowding. Each family might be gathered together as far as practicable into one mass, while members of the same family might be used as nurses, and to afford shelter till the permanent trees were gaining bulk so as shelter themselves and each other. By such simple means the trees would grow as fast again, and assume more natural forms. The whole would also be healthy from the first, and be more likely to continue so ever afterwards. The effect, too, would combine variety with uniformity. For example, a single oak may often be very grand, but a group of oaks of many different varieties, all having sufficient space to develop their peculiar characteristics, and placed close enough to give and derive support from each other, would be a sight to see perhaps but once, but to remember ever afterwards.

No one need be alarmed about the large area needed for this mode of displaying trees. Few of our readers might have room for a group of all known oaks; but almost every one might find a space for a group of three, five, seven, a dozen, fifteen or twenty. And so of other trees. Instead, for example, of scattering isolated plants of *Pinus excelsa* here and there, why not plant a group of three or four? Or, if more variety is desired, there is no reason why a group should not include such congruous species as *P. macrocarpa* and *P. Sabiniana* with the *excelsa, Weymouth* and others. Each would thus give strength and borrow beauty from its neighbour, and the whole be the better from their closer proximity. General effects could thus be heightened and varied almost to infinity, by the grouping of trees either on the principles of harmony or contrast. Even the nurses instead of detracting from the stature or grandeur of the trees, might be so managed as to add to both; while their effect in exciting, or fostering and sustaining growth would be wholly beneficial. Some object to nurses on the two grounds—that they exhaust the soil, and that their dead roots prove injurious to the permanent trees. The first objection is easily met by a top-dressing when the nurses are removed, and the second will have little force if due care and caution is exercised in the removal of the roots of the nurses. Besides, trees are seldom injured by the roots of trees of kindred species. But the grand feature of the grouping as distinguished from the dot planting of ornamental trees is, that the trees nurse one another. By studying the stature and the natural habits and forms of trees, and planting in accordance with these, the wants of each member of the group may be met; while each individual will have that place assigned to it where it will tell to most advantage, not only on the growth but on the artistic effect of all the others. Not only will the more dwarf be reserved for the outer edges of the group, but the more hardy for its more exposed and colder aspects, and thus the whole group will be well nursed, and the nurses themselves find that place in the group that will suit them best.

THE QUEEN'S OAK AT GRAFTON.—The *Journal of the Northamptonshire Natural History Society* for November, 1880, contains a photograph and description of the tree known as the Queen's Oak, at Grafton. This tree is more interesting from the story connected with it than remarkable for size, though its hollow trunk measures upwards of 22 ft. in circumference at 5 ft. from the ground. It was under this oak, according to tradition, that the widow of Sir John Grey, of Groby, first met Edward IV., whom she had sought to implore the restitution of her slain husband's forfeited estates. Edward was captivated with her person and manners, and finding her virtue inflexible, was married to her, though the marriage was not proclaimed till some months afterwards. Baker, *History of Northamptonshire*, says:—"Elizabeth Wideville, an ancestress of the present Royal Family, and the first British lady, subsequent to the Norman Conquest, who shared the throne of her Sovereign, was eldest daughter of Richard, Earl Rivers. Her first husband was Sir John Grey, of Groby, who fell at the battle of St. Albans, and being a zealous Lancastrian his estates were forfeited by the victorious Edward, and the widow returned to her parental home at Grafton."—*Gardeners' Chronicle.*

# Is the Decomposing Refuse of Trees Injurious or Beneficial to Growing Trees?

BY JAMES CRAIG, WESTON PARK, SHIFNAL, SALOP.

IN the last issue of the *Journal*, Mr. D. McCorquodale refers us to the May, June, and August numbers, and there we find him explaining his views under four heads.

FIRST.—He says, page 82, "let us go to the fir woods, especially those growing on dry barren soils" (the most unlikely place of all others for one to find them doing any harm apart from the insects that might breed in them). There they would be beneficial in preventing the evaporation of moisture, and would enrich the ground as they decompose. But how about low-lying, damp and rich ground? Here they do more harm than good if allowed to lie in any quantity, in preventing the action of sun, light, and air, from getting at the roots and the decaying matter to make it the proper food for the roots.

It is also in these low-lying, damp, ill-drained places, where they encourage the growth of the fungus tribe, and it is only trees of a gross feeding habit, like the Spanish chestnut, that will succeed in these places. I have a case here of a spruce fir that has been killed by fungi in the same manner as Mr. Dunn describes, as quoted Vol. IV. p. 20. One could have judged better the cause of the non-success of Mr. Dunn's plantation if he had told us the nature of its situation, soil, and whether drained or not.

If the refuse of trees are an eyesore, or likely to be injurious, and cannot be sold, let them be burnt on the ground and their ashes spread about. They will then be in the best possible state for nourishing the trees, and fixing ammonia in the ground.

As for Mr. McCorquodale's poisonous gas theory, I dare say he did not rear his young Scotch firs in sawdust in a low, damp, shady place, but where they got both light and air. I have seen a large healthy Scotch fir growing by the side of an old saw-pit, and its roots luxuriating in the rotten sawdust, but it had plenty of light and air. Look at low, damp, shady places, where there is much refuse lying, and you will find the under branches of trees die; even grass and other undergrowth will not live, because of the bad gases, or if you will, the want of pure light and air, and they even endanger the lives of large trees that grow amongst them.

SECOND.—At page 213, Vol. IV., Mr. D. McCorquodale tells us that decaying rubbish is said to encourage the breeding of injurious caterpillars and beetles.

In regard to the caterpillars, will he kindly tell us how he found out that these bred or were influenced in any way by the rubbish? Scientific men tell us they are the progeny of the sawfly, and we know that these flies deposit their eggs on the leaves where the caterpillars are hatched and reared, the same as those on a gooseberry bush. He tells us the ichneumon-flies attack the caterpillars with ruthless ferocity. Did he ever see them? It would be very interesting if he would favour us with a sketch of one attacking a caterpillar. I saw a garden last year where the gooseberry bushes were completely stripped of every leaf, and there did not seem to be any ichneumon-flies there. It is an old proverb that "prevention is better than cure." I was told that if a few branches of the elder bush were stuck in the gooseberry bushes, they would prevent the caterpillars. I tried this last year and found it correct. It is a fact that very few kinds of flies like the smell of the elder tree, thus they are a good shelter for cattle.

The old fir plantation I referred to, as having been attacked by caterpillars, was the Shelton Wood, Erskine, Renfrewshire; they so spoiled the look of the trees that the proprietor had them cut down and sold.

Of the beetles that feed on dead or decaying trees, Mr. McCorquodale takes *Hylobius abietis* as an example, and goes on to quote how very destructive they are to newly planted fir trees.

I once had charge of a plantation that was nearly destroyed by them. I employed girls and boys to gather them in bottles, then they were counted and destroyed, and I paid them so much per dozen for catching them. They used to lay down good-sized branches, cut from large fir trees, and on these they found lots of beetles came to feed; they required to be very cautious, and keep their eyes about them when touching the young trees and branches, as the beetles let go their hold and fell into the rough grass; this shows that they prefer the tender young bark to the decaying, if they can get it. I have also seen their bites on older trees, as I said in the January number (which was misprinted alder), in the way Mr. Tivendale describes, showing that the ground rubbish is not their only habitat, and that they can do more harm than earth-worms.

The third class considered by Mr. McCorquodale are those beetles which he says feed on the growing timber of trees of which *Hylurgus piniperda* is a fair type. He then goes on to describe the way he thinks they are propagated. Has he or any one else ever seen them in the various stages he describes, in the young shoots of fir trees? I have opened shoots at all seasons of the year, but never found anything but the matured beetle.

It was in December last that I found one, and it was a full-grown beetle. According to Mr. D. McCorquodale, it should then have been either in its grub or chrysalis state. I am of Mr. W. McCorquodale's opinion, that they are bred in the decaying bark, and only ascend the trees to feed, and the food they prefer is the pith of the young shoots. They enter the branch a little below the bud, and eat their way upwards to the bud, then emerge out and away to another shoot, as told us by Mr. Tivendale, so that the remedy prescribed of cutting off the affected shoots, and burning them, is of no use, as in most cases the deed is done and the insect 'gone before the branch shows any signs of its having been there. Since writing the above, I have been making a search in some old bark and found the insects both in the grub and full-grown state. These were got in the bark of some young Scotch fir thinnings that were left lying in the plantation; and I believe they also breed in the corky bark of old fir trees. What strengthens my idea is, the fact that I find them do more harm in young plantations here near to old fir trees than where there are none. I have never seen any of the large beetles since I came to England, and I think the reason is, that there is no rubbish left lying about the woods, all refuse finding a ready market for oven-heating.

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EATING YEW LEAVES.—Recently six beasts belonging to Mr. H. Matts, Gaddesby, near Melton Mowbray, found their way into a plantation owned by E. H. Cheney, Esq. There they ate the leaves of the yew trees, from the effects of which they all died. The animals are said to have been worth £20 each.

MANUAL OF THE CONIFERÆ.—Messrs. Veitch of Chelsea announce for publication early in March a work with the above title, including a general review of the order, a synopsis of the genera, species, and varieties suitable for the climate of Great Britain, and a section on the planting of conifers as a branch of British arboriculture and horticulture.

SHEEP AND TREES.—A correspondent of the *New York Tribune* recommends the following wash as a sure preventive of sheep barking or gnawing fruit or any other trees:—Take soap, the dirtier and more stinking the better, and make a very strong suds; dissolve ½ lb. of whale oil soap in every six gallons, and into this stir sheep manure until it is as thick as good whitewash, with which mixture wash the trees as high as the sheep can reach, and no sheep will come near enough to rub against them for at least two months, the time depending on the amount of rain. "We keep the mixture handy and repeat the application as often as necessary, usually not more than twice in a summer. Sheep running among fruit trees should have plenty of good fresh water; it is thirst that first induces them to gnaw the bark, but after they have once got a taste, they eat because they like the bark."

# Pine Trees at Penrhyn Castle.

By ANGUS D. WEBSTER, Penrhyn Estate, Bangor, North Wales.

In a former number of the *Journal of Forestry*, I gave the measurements of some of the best of our rarer conifers growing in the park here, and now purpose detailing the pines in a similar manner, which may serve the double purpose of being instructive to lovers of such, and also a record in future years by way of reference and comparison.

From a list preserved here it would appear that at one time most of the pines then introduced were planted out as specimens over the park; of these many have died out altogether, others progressed very slowly, and additions were made of the kinds that seemed to suit the situation, foremost among them being the *Pinus laricio, cembra, picea, strobus, inops, austriaca, excelsa* and *pinaster*.

*Pinus laricio* growing on the lawn to the south-west of the castle. Height 69 ft. and girthing at 3 ft. up 8 ft. 8 in., with a diameter of spread of branches of 39 ft.

By neglect in early growth this tree was allowed to retain a plurality of leading shoots, two of which branch off at 7 and two at 11 ft. from the ground, the largest of each girthing at 3 ft. from point of junction 5 ft. 8½ in. and 5 ft. respectively. The limbs are perfectly straight, and each would make a good-sized tree of itself. This pine thrives admirably here and several little inferior to the one described may be found scattered throughout the park and surrounding plantations; it deserves to be cultivated extensively, as apart from its free growth and majestic appearance, the timber is quite equal to the red deal of commerce.

*Pinus strobus.*—In the formation of a new plantation here twenty-two years ago, along the London and North-Western Railway, this pine was freely interspersed with *Abies Douglasii* and other hardwoods, where it has proved itself quite at home, several standing 40 ft. in height and with a circumference of from 3 to 4 ft. at 3 ft. from the ground; but by far the finest specimens of this tree are growing near the entrance to the park from Port Penrhyn, some of which measure 56 ft. in height and with a circumference of stem at 3 ft. from the ground of 5 ft. 3 in.

*Pinus pinaster.*—This tree prefers an open and airy situation, and in the vicinity of the sea, where the temperature is to some extent equalized, it attains large dimensions. Planted amongst other trees it has a tendency to grow crooked, produce large side limbs, and if at all crowded lose the foliage to near the top. The wood of the tree is generally soft and in most cases of but little value. The largest tree of this kind is in the flower garden, standing 59 ft. in height and with a circumference of stem at 3 ft. from the ground of 11 ft. 7 in., and at 6 ft., 8 ft. 4 in. This tree produces annually a large quantity of cones, from the seeds of which we have raised several lots of fine healthy plants, much hardier, I have no doubt, than those raised from imported seed.

In raising this pine one thing must be particularly attended to—viz., that the young plants, if allowed to remain long in the nursery lines, must be frequently transplanted, as neglect of this generally proves fatal to the tree when planted out permanently.

*Pinus austriaca.*—Perhaps few of the pine tribe possess the many good qualities which can be attributed to this species. Whether for shelter, effect, adaptation to different soils and situations, or planting in maritime districts, it is invaluable.

The timber is also tough, resinous, and well fitted for resisting the evil effects attending the change from moisture to dryness. Around the margins of most of the seaside plantations here this pine is extensively planted, as it not only withstands the rough sea breeze better than any other, and by its thick and strong foliage renders a great amount of shelter to other less hardy kinds, but also by its dark glossy appearance presents a striking effect when viewed from a distance.

The average height of [the tree here is 40 ft., and girthing at 3 ft. from the ground 4 ft. 6 in.

*Pinus excelsa.*—The light silvery foliage of this pine renders it very desirable for contrast, especially along the outlines of plantations which can be seen from drives or roads. Mixed with the Austrian and other pines of a darker foliage along one of the carriage drives here, it has a very pleasing effect. In general appearance this tree bears a great resemblance to the Weymouth pine, from which, however, it is easily distinguished, the leaves being about double the length, the tree of a more robust habit of growth, and the bark much rougher than on that species. It requires to be planted in a sheltered position, as on exposed ground the foliage becomes scanty and the tree stunted in appearance. Our best specimen is growing in a clump of mixed pines opposite the castle, where it is sheltered by taller trees from the prevailing winds, and measures 3 ft. 8 in. in circumference of stem at 3 ft. up, and 41 ft. in height.

*Pinus cembra.*—Being of but slow growth and recent introduction none of this species has attained great dimensions here, but from the healthy appearance of several planted out as single specimens in the park, as well as others interspersed through some of the general plantations, we anticipate well for them in the future. This pine also luxuriates in maritime districts, the two best specimens here standing within a few yards of the sea, though partially sheltered by a narrow strip of wood, the larger being 35 ft. in height, and girthing at 3 ft. from the ground 2 ft. 8 in.

*Pinus sylvestris.*—This is the only species of the pine tribe indigenous to Britain, and derives the name of Scotch fir from being only found in the northern parts of Scotland, principally Inverness and Aberdeenshire. What is called the true Highland pine, a native of these districts, is far superior to any that has been introduced, the timber being of greater value and the tree much hardier in constitution.

This true Highland variety (if variety we can call it) is unfortunately rather rare in this district, giving place in most cases to inferior varieties or degenerate kinds, the timber of which is comparatively useless, and the tree unfit for planting unless in the most favourable situations; one out of several fine clumps, however, stands near the entrance to the Pass of Nant Francon and close to the Penrhyn Slate Quarries, containing a goodly number of fine old healthy trees, the stately form and general appearance of which would suggest, even to an unexperienced eye, that they belonged to the true type.

OBITUARY.—We regret to notify the death of M. W. Tivendale, forester, aged 45, which took place on Jan. 17, at Bromhouse, Galston, N.B.

A FREAK OF NATURE.—In Oceana county, Michigan, a large maple tree about 30 in. in diameter stands about two rods from where one about 15 in. in diameter starts from the ground, and both grew solid together at a height of about 40 ft.

THE LARGEST CHESTNUT TREE IN THE UNITED STATES.—This is growing on the farm of Solomon Merkle, at Berks, Pa., and is nearly 40 ft. in circumference at the base. The top of the tree is reached without danger by steps that are fastened between the limbs. It is estimated that this tree contains about 17 cords of wood. It will yield about 300 bushels of chestnuts annually.

LARGE CEDAR OF LEBANON.—One of the finest specimens of this tree is to be seen in the garden of Mr. W. J. Lloyd, of Langleybury, Herts. It measures 4 ft. from the ground, 22 ft. 4 in. in girth, the branches extend over 105 ft., and its height is 107 ft. The weight of its branches after a heavy fall of rain or snow is such that each limb has been secured to the stem by iron rods to prevent them breaking off. Upwards of one-and-a-half tons of iron have been used to secure it, and quite a network of iron is spread beneath the branches, so skilfully arranged as not to detract from the perfect and graceful form of the tree.

## EFFECTS OF THE RECENT SEVERE WEATHER.

SIR,—The month of January, 1881, will be long remembered by all, for the almost unparalleled severity of the weather, and I fear that the damage done by the frost to trees and shrubs is very great.

I have noticed no less than eight trees cracked by the frost, and have no doubt that I shall find several more. Many laurels, bays, arbutus, and other shrubs, are most pitiable objects, being quite killed to the ground. The river Tame was frozen over, the ice being from six to eight inches thick; it broke up on January 30, and the great blocks of ice have done much damage as they floated down in barking the trunks of trees growing on the river bank; some of the blocks were more than 20 feet in length, and from 10 to 15 feet wide; the river often became chocked with them, and then they began to pile one upon the other, which caused a very grand effect. The damage done by the gale on Tuesday, January 18, was very serious here. I have had 35 trees blown down; Scotch and spruce fir have fared worst with their heavy tops, some have snapped off right through the middle. The thermometer here on the night of January 14 was 8° below zero.

I hear that the young wheat has seriously suffered from the frost in this neighbourhood, in fact some farmers fear they will have to sow their land afresh, as the wheat is quite dead.

*East Staffordshire.*

A Keen Forester.

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SIR,—The gales of the 8th and 10th instant have destroyed a considerable number of fine trees (especially elm) in Hampshire, and notably a fine Lombardy poplar that stood in the grounds of Greatbridge House, near Romsey. It had a circumference of 13 ft 9 in. at 4½ ft. up, and a sheer height of 119 ft. This is the largest specimen that I have met with in my survey of Hampshire.

JOHN SMITH.

*Cupernham House, Romsey, February* 14, 1881.

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SIR,—Noticing J. W.'s notes of the effects of the gale on the 18th January in East Suffolk, I may add that, being so destructive, it was also severely felt in the western part of this county. On the estate of Captain Powel, of Dunkerstone Park, near Bury St. Edmunds, many fine young specimens of conifers in the parks and pleasure-grounds were turned over like so many ninepins. Varioue trees were torn up or disfigured in other parts of the county. On the Hardwicke estate several fine silver firs in a well-sheltered wood were overthrown, and a common spruce broken off about 10 ft. from the base. The cedars and other conifers escaped with the loss of a few boughs, with the exception of one, which was literally rent into fragments by the gale, the trunk being torn also, as if shattered by lightning.

The heavy snowstorm did no harm to the trees, for the simplest of all reasons, as not a flake was left resting on them, the whole being swept off clean. Where the bottom branches were drifted up, as they were in some cases to the height of several yards, the rabbits made great havoc among them; they were also most destructive to hollies during the winter. The severe frosts have not injured nor killed such trees as *Taxodum sempervirens* and *Pinus margano*, nor evergreen oaks or laurels, as it did in the memorable winter of 1859—60.

*Hardwicke, Bury St. Edmund's.* D. T. Fish.

Sir,—This district was visited by a severe storm from the 6th to the 8th inst., which did a great amount of damage by uprooting many valuable trees, as well as depriving others of branches by which they have been greatly disfigured. In the Menai Straits the force of the wind was reported to be equal to that experienced at the time when the *Royal Charter* was wrecked.

Standing high and on the sea coast, the wind swept over this estate with unusual severity, levelling with the ground quantities of trees standing singly as well as those throughout the general plantations.

A fine old cedar of Lebanon in the flower garden has suffered severely, and been rendered very unsightly by the loss of many of its largest branches, though, strange to say, another tree of the same kind growing within a dozen yards has escaped uninjured.

A large elm growing on the lawn near the castle has been uprooted, also several fine *Abies Douglasii* throughout the park.

In one case as many as thirty-five trees, principally larch and Scotch fir, were either broken or blown over in the corner of a plantation exposed to the south-west, from which the wind was blowing.

Nearly all the plantations growing on bare and exposed situations have suffered more or less from the effects of this gale, and some time will elapse before the gaps made can be obliterated.

*Penrhyn Castle, Bangor, North Wales.* Angus D. Webster.

## THE GROWTH-RATE OF LARCH AND SILVER FIR COMPARED WITH SOME OF THE NEWER CONIFERÆ.

Sir,—When forming the Pinetum here some twenty-six years ago, I planted larch and silver fir as two of the fastest growing of the older coniferæ, along with some of the newer ones, with the view of ascertaining how the older would compare with their new rivals from abroad, and the following is the result, all being treated in the same way, and every one measured being the best of its class:—

| | | | | |
|---|---|---|---|---|
| *Wellingtonia gigantea,* | 10 | cubic ft. | 6 | in. |
| *Abies Douglasii,* | 10 | ,, | 2 | ,, |
| *Pinus laricio,* | 9 | ,, | 10 | ,, |
| *Pinus monticola,* | 9 | ,, | 10 | ,, |
| *Picea nobilis,* | 9 | ,, | 9 | ,, |
| *Cedrus atlantica,* | 8 | ,, | 6 | ,, |
| *Cedrus deodara,* | 8 | ,, | 4 | ,, |
| *Abies alberta,* | 8 | ,, | 3 | ,, |
| Larch, common, | 8 | ,, | 2 | ,, |
| Silver fir, | 8 | ,, | 0 | ,, |
| *Taxodium,* | 8 | ,, | 0 | ,, |

All the other varieties are from 1 to 3 ft. less than the above. The larch and silver fir I had to take out last month to make room for more valuable plants. The former was quite free from the aphis, but not so the silver; the whole trunk was covered with it, and had been for at least two years, and yet neither the larch nor any other coniferæ was in the least affected by the aphis, a circumstance which goes far, in my opinion, to explode the theory that the aphis migrates, or that one tree affects another.

JOHN MCLAREN.

*Hopetoun, Feb.* 15, 1881.

## SCOTCH PINE FOR MOORLAND PLANTING.

SIR,—I have just by chance turned up the number of the *Journal of Forestry* for May, 1880, No. 37, and am surprised to find Mr. W. B. Smith there representing me as saying Scotch pine is not adapted to moorland planting. I am certain I never was the author of such a statement, for I believe and act upon the very opposite principle. What I have often said and I see no reason for altering my opinion, is that all manure, or land that has been manured, and especially thin moorland that has been under cultivation, and therefore manured, is much against the Scotch pine or any pine. I think Mr. Smith will find that is the sentiment and expression of what I said, and that what he attributes me with as having said is incorrect. I have not the article before me from which Mr. Smith quotes, or rather misquotes, but I am certain he is wrong; but, at all events, if he is not wrong, I must have gone very far astray, and away from all my ordinary tenets of belief. Mr. Smith is considerably alarmed at some of my statements here and there being out of harmony with standard authorities, and if I go as far from the lines, in order to be singular, as he not unfrequently does, he certainly has just reason to complain. C. Y. MICHIE.

*Cullen House, Feb.* 16, 1881.

## HORNSBY'S HEDGE CUTTER.

SIR,—I think Mr. Kay has spoken just a little too strongly about this machine. We know that perfection is not reached in a bound, and I have no doubt that Mr. Kay himself tried a good many experiments before he brought his tree lifter to its present state of efficiency. It occurs to me that the reason why there has been no "definite expression of opinion" as regards the hedge cutter, is perhaps the fact that it is looked upon more as a first and very fair attempt to solve the problem of how hedges may be cut by machinery. Mr. Kay is wrong in supposing that the hedges require to be dressed "every few years to suit the machine." As I understand it, when once they are got into the proper shape, that is sloping equally on both sides, they can be cut for an indefinite period by the machine. Some of the hedges operated upon at Pilton were slightly rounded on the surface, which of course did not give the machine a fair chance, as the knives can only cut in a straight line. With great diffidence I would point out what I consider two defects of the hedge cutter. First, it is too rigid. The gearing that supports the knives ought to be so jointed to the frame that the knives will be kept constantly on the hedge whatever the inequalities of the ground may be. As it is at present, if the off wheel goes into a hollow, in an instant the knife bar is tilted away from its work, and before the man can get it properly adjusted, a yard or more of the hedge has been missed altogether. Secondly, the man who guides ought to walk instead of sitting on the machine, because if it pitches either to right or left, he is carried along with it, which of course makes the work of guiding very difficult indeed. When he is on the ground, however, it is different; to some extent he sees what is before him, and can calculate accordingly; the jolting of the machine also does not affect him, so that he is in a better position every way to guide the knives. I make these remarks all the more freely because we have had a hedge cutter on this estate for some years, which does its work fairly on level ground, but it also has the fault of rigidity already referred to. It is to be hoped that this difficulty will be solved before long.

I must express my admiration of some of the qualities of Hornsby's machine, not the least noticeable being the silence with which it does its work. The process also of setting the knives at the different angles, and the crank movement which adjusts itself to those different positions is most ingeniously done. We can only trust that this enterprising firm will soon produce a machine which will trim our hedges as neatly as is now done by hand, and for what they have already done in this direction I am sure they are entitled to our gratitude.

*Dalkeith Park.* R. BAXTER.

## PROPOSED SCHOOL OF FORESTRY AT EPPING FOREST.

SIR,—A proposed School of Forestry has been before the public for some time, and not a little has been both said and written on the subject north of the Tweed. None of the abortive schemes, however, which have either been mooted or advanced possess the common-sense practical ring which is the chief merit of the proposal submitted lately by Mr. Mackenzie to the Corporation of London.

At present the training of the British forester is purely practical; he is generally left to pick up the technical part of his business as best he can.

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Now, I believe that under the present method the aspiring forester, if he has perseverance enough to acquaint himself with botany, soils, engineering, and other studies bearing upon forestry, could not be given a better training than the one at present in use. I am speaking here more particularly of what has come under my own observation on Scotch estates, on many of which, circumstances considered, a better state of management could not exist under any other system of training. In Scotland it is the rule now to meet with foresters who understand their business thoroughly, from the rearing of trees, and through all their intermediate stages, to the time of marketing. A larger amount of mere scholastic education might probably make him a man that would flourish a good deal more in print, but not a better forester. The present method has this in its favour, however, that it produces men of action; this is precisely what is wanted now-a-days. Hitherto any proposal for a School of Forestry has savoured far too much of the theoretical; in fact, had any of them been adopted, they would only have made foresters on paper. This would have been a complete inversion of the present order of things. The process of training just now in use needs only to be improved, not reversed. Now, it appears to me this is what should commend Mr. Mackenzie's proposal to every one interested in the matter; it is just a carrying out and an improvement of what is at present in use—it not only provides for a thorough practical training, but also ensures the requisite amount of technical knowledge besides. Mr. Mackenzie has made the basis of his educational scheme a practical basis—the system is sure to produce men of business, men of despatch, not men whose minds will be easily carried away with some of the crudities to be found in forest literature. In adopting Mr. Mackenzie's proposal the Government would only be consulting the interests of the British Empire. Although a good system of training may be said to exist and has produced first-rate foresters, yet the new proposal would yield certain advantages which are not possessed by the present arrangement. In order to see and be able to develop certain methods of treatment, one single lifetime often does not suffice for this object; now a School of Forestry, equipped with a permanent staff, would be some sort of guarantee for continuity of management. But there are other advantages besides—the facts as regards rearing, treatment, diseases, and every other phenomenon of plant life would accumulate in a much larger volume in an institution of this kind than if left to isolated individuals, however eminent. There would be also greater opportunities for observations and experiments, and absolute certainty of these being preserved for the benefit of science.

Too much must not be expected, however, from a School of Forestry. It cannot step in and dictate to a proprietor how his woods should be managed. Every Briton is free to act. And as long as proprietors in barbaric fashion keep their woods as preserves for all sorts of vermin, farewell to any improvement in British forestry. Happily, however, there are symptoms in this quarter of a change in the right direction. The British forester when left entirely unfettered, displays no small amount of economy and skill in the management of woods, and taken as a whole is a man who generally understands his business, and Mr. Mackenzie's scheme would certainly raise his educational status, and in many cases make him even a better forester.

W. W. R.

## THE SCOTTISH ARBORICULTURAL SOCIETY.

Sir,—I may or may not be one of the "persons" referred to by Mr. McKenzie (page 657) as making "complaint" because of the Society "not finally settling *all* about the larch disease." No "saying" of mine ever laid much "to the account of the Society." If Mr. McKenzie believes the *sap is thrown back* on the bole sap vessel because of the aphis attacking the extreme point of the branches, and that the sap *being thrown back* is the *cause* of *ulceration* on the stem, he must really be confident the Society "grasps the matter with sufficient intelligence." How many of your readers believe this, *i.e.*, the sap being thrown back? As "each individual member is responsible for matter of importance not being fully gone into," who is responsible for matter not of importance? When "frail brethren" wish to "recite their experience" but are afraid to "stand up" for "fear of breaking down," "communicate with the secretary, they will be attended to to their (frail brethren) satisfaction and the edification of fellow-members." This is assuming no ordinary amount of "intelligence" far surpassing that displayed in the late debate on the larch disease. If "few enter into" the Society's "discussion" there is no reason why they should not—"if justice were not done"—re-open the subject in the *Journal*. Mr. McKenzie appears to think differently. What does Mr. McKenzie mean by "common courtesy" and that we should "criticise courteously"? I have seen nothing discourteous to the Society appearing in the *Journal*. On the contrary, everything which has appeared referring to the Society, directly or indirectly, has shown the utmost forbearance on the part of the writer. I maintain that the *Journal of Forestry* is the proper place to lay before the British forester all matters connected with forestry, and the nature and history of the larch disease especially.

*Ballinacourte, Tipperary.* D. Sym Scott.

## WOODS AND THEIR MANAGEMENT.

Sir,—W. W., in last month's *Journal*, at p. 655, states :—"Whilst passing through an estate lately I observed a plantation of Scotch firs, about ten years' growth, pruned up to within 4 ft. from top. They varied from 2 to 5 ft. apart. Will any of your readers give their opinion upon such treatment? My opinion was asked, and I condemned it. Was I right?"

I reply, most certainly he was quite right, and as justified in disapproving of such a ruinous operation practised on the young trees, as W. W. would have been in condemning the proceedings of a farmer with a field of turnips ready for thinning, who instead of singling out the plants to the proper distances apart, caused the under leaves to be stripped off every plant, taking none out, but just leaving them growing and struggling together as they came up through the ground from seed, thinking, perhaps, that the remaining or top leaves would afterwards absorb from the succulent root a superabundance of its juicy substance. The farmer, after so treating his turnips, would soon find to his loss that he had, through ignorance, caused the complete failure of what otherwise, if judiciously and timely thinned, might have been a very valuable crop.

In like manner also will the owner of the fir plantation which W. W. refers to, find to his irretrievable loss and disappointment in many respects that his plantation is entirely ruined for ever. The trees forming it in all likelihood after being so pruned, will never attain to larger dimensions than that of pitwood and firewood, and even should they exist, and grow into medium-sized trees, the quality of the timber will be next to useless, from the simple reason that the resinous juice which begins to flow immediately and continues exuding out of the tree ever after the amputation of the branches from the stem is just the resinous substance essential to sustain the tree in life, and perfect health and vigour; consequently the progress of the tree is at once arrested, and its constitution impaired from the evil effects of its wounds and blemishes.

Plantations of Scotch firs should therefore never be pruned—nor, indeed, any of the coniferæ order of trees—further than keeping the leaders single. What is generally required to be done to a fir plantation of about ten years' growth is to go over it all very carefully, taking out all plants which can be spared that have lost their leaders, and weakly, drawn up, and feeble, unhealthy-looking plants, keeping a sharp look-out for any that may be found to have been attacked with wood-beetles, field-mice, or harbouring fungoids, or which have suffered from any other casualty, the effects of which might be to spread disease.

A young plantation requires thinning whenever the trees are observed pressing rather closely to one on the other, intercepting and excluding to too great an extent the free circulation of sunshine and air; then no time should be lost in having a sufficient number of the worst trees removed, in order to admit gradually by regular thinnings the invigorating influences of the atmosphere, without which trees can never be expected to grow to large and profitable dimensions.

The forester plants his trees closely at first, on the same principles as the farmer sows his turnip seeds thickly, first, in order that the energies of the soil may be the sooner converted into the growth of the tender plants; and secondly, that weakly and unpromising plants among them may be dispensed with, and the more vigorous, robust, and healthy retained for the permanent crop.

D. STALKER, *Forester*.

*Brenmore Estate, Argyllshire.*

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SALE OF WOOD AT ALTYRE.—The annual sale of wood in the Altyre plantation took place on the 22nd January, when 376 lots were exposed, consisting of oak, ash, elm, beech, scots fir, and larch. Owing to the heavy fall of snow the attendance was not so large as on former occasions. Oak sold from 9d. to 2s., ash, 1s. to 1s. 7d., elm 1s. to 1s. 6d., beech 1s. to 1s. 3d., Scotch fir, 7½d., larch, 10d. to 1s. 1d. per cubic foot.

## QUESTIONS.

76. Wire Strainer.—Could any of your correspondents say if they have seen a wire strainer that could strain six wires at once in a line of fence? A forester who has lately come from Scotland to an estate near this says he has both seen and used such. I do not mean the ordinary iron winding pillars.—Ranger.

77. Natural Grown Larch.—I find on this estate and neighbourhood that the natural grown larch are almost free from disease, whilst our transplanted ones, in many cases, are failures.

Will any of your numerous readers give us the reason why the natural grown larch are healthier than the transplanted?—Geo. Wyllie, Balloyie, Aboyne.

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Castle Ashby.—This, the seat of the Marquis of Northampton, in Northamptonshire, is a fine Elizabethan house, standing on high ground, having on two sides gardens and terraces, and on the third an elm avenue three miles long. In 1715 four elm avenues were planted on the four sides. Of three of these only here and there an old elm remains; but the fourth, originally about a mile in length, was continued by the late Marquis of Northampton.

Stealing Sticks.—Peter Porter was charged before the Barnsley Police Court on Feb. 14 with stealing a quantity of sticks from a wood belonging to the Earl of Wharncliffe, at Carlton Lanes, and with doing damage to the amount of 20s. A witness named Moxon, a woodman, said he saw defendant leave a wood with a bundle of sticks on his back. On charging defendant with stealing them he replied he had bought them for 2s., but it was afterwards ascertained that such was not the case.—Defendant, who had been previously convicted, was committed for three months.

Plant Labels.—The council of the Society of Arts are prepared to award a society's silver medal, together with a prize of £5, which has been placed at their disposal for the purpose by Mr. G. F. Wilson, for the best label for plants. The object of the offer is to obtain a label which may be cheap and durable, and may show legibly whatever is written or printed thereon; the label must be suitable for plants in open borders. These considerations will principally govern the award. The latter will be made on the recommendation of a committee which will be appointed for the purpose by the council. Specimen labels, bearing a number or motto and accompanied by a sealed envelope containing the name of the sender, must be sent in to the secretary of the society, John Street, Adelphi, London, not later than May 1, 1881. The council reserve to themselves the right of withholding the medal and prize offered if, in the opinion of the judges, none of the specimens sent in are deserving.

## ENGLAND.

PLANTING upon wet lands will still be considerably in arrear in many places, where the early dug holes have until lately stood filled with water. The results of planting in such are to most foresters known to be very disastrous. Better to defer the work until April than to continue it under such adverse circumstances. Whatever hardwoods are now to be removed, the work should be systematically arranged so that no plants may be long out of the ground. And as drying east winds are generally prevalent at this season, the raised plants should be speedily tied up in bundles and have their roots immersed in a puddle of clay and water, if they are to be carried any distance to the woodlands.

Proceed with the thinning of plantations of all kinds except oak All trees, and more especially plantations of larch, suffer from this work being carried on after the buds begin to break. The admission of cold winds by heavy thinnings at such a time effectually checks the progress of the remaining trees.

Coppice falling should if possible be finished in March, and all the produce carted out before the young shoots begin to break out upon the stools. Wherever such cannot be cleared at once, it should be carried out and laid along the sides of the clearance roads and off the stools. Both in the thinned plantations and coppices broken branches and brushwood should as much as possible be cleared from the falls.

Hedges of hawthorn, beech, and hornbeam should be planted up at once; the hawthorn more especially as it comes early into leaf. Overgrown hedges in exposed sites may also be trimmed in closely towards the end of the month.

March is one of the busiest months in the nursery, where the manuring and digging of cleared quarters, the transplanting of young trees, the preparation of seedbeds and the sowing of many kinds of tree seeds, will in favourable weather tax the energies of all employed. Seedling thorns, oak, ash, and beech may be transplanted early. Proportion the distances in the rows to the size of the plants and the length of time they are intended to remain in the nursery. Overcrowding is generally the bane of nursery goods, and the fertile cause of failures or of weak and tardy growing trees in our woodlands. Nothing but ample room will give that robust growth which ensures success after planting.

Cuttings of elder, willow, and poplar may now be put in. As the season advances the sloughing of the bark by thrusting the cuttings into hard ground should be guarded against. All plants which get an early start should be removed as soon as possible. The birch is one of these. A loose soil, even if mossy, suits it. Give one year's seedlings about 22 in. by 4 in., and two years' plants 15 in. by 5 in.

Seeds of various kinds may now be sown from the rot-heap, covering them with depths of soil proportioned to their different sizes. Too thick a covering is a common fault. Elm seeds should be put into land tender and rich. They succeed well after vegetables when the land has been kept clean. They should not be covered with more than half an inch of soil. Sycamore plants are liable to suffer from the spring frosts if the seeds are sown too early. Birch and alder may be sown tolerably thick. Beechmasts should not be put in before the end of the month, and they require a covering of about an inch in thickness. Any remaining acorns, walnuts, and chestnuts, should now be planted in beds and well protected from mice and other enemies.

Examine recently made plantations, removing all dead trees, and cutting back such as have died down and sent out scions near the ground. Grafting may also be commenced, and oaks, beeches, and elms may at once be operated on. Layering is also in some places carried on in the spring; and the old layers of all kinds may now be severed from the stools and planted out. Secure the larger transplants by staking and tying them, as March winds are apt to do much damage. Some which have been recently removed may require mulching if the weather proves very dry.

Plant osier beds, trim up hedges of holly, yew, and box, roll lawns and pleasure-grounds, put gravel upon drives and footpaths, repair fences of wood and wire before cattle are turned into the pastures, and mark oaks for felling and stripping next month, so as to be ready with the requisite number of hands for completing the operation in good time. Pay attention to the open watercourses in the woods, and where necessary dig out new ones. Also dig young birch and other plantations where the grass and weeds are gaining ground.

Large trees intended for transplanting next season may now be trenched round, having their rambling roots cut off, after which the trench may be refilled with a good compost.

*Pluckley, Kent.* A. J. Burrows.

## SCOTLAND.

In consequence of the continued snow-storm, planting has been completely at a standstill last month, except on a few favoured spots along the west coast of our island. Every preparation should be made in the meantime, however, to facilitate that operation once good weather does come. In many cases it will not be possible now, after such a long tack of bad weather, and at this advanced stage of the season, to overtake all this kind of work intended to be done. Next to planting out, the home nursery will be the most pressing work of the month. Owing to the unfavourable season a good breadth of stuff may have to remain a year longer in the lines than it should have otherwise done. In such cases it is a good plan to interline, and also raise the roots of those which are left, to prevent their running too much. Frequent transplanting in the nursery, in order to give a preponderance of roots, is one of the best guarantees of the future success of a plantation. This treatment is absolutely necessary for some high districts of Scotland. It is most beneficial to the larch; if this tree is transplanted every year, at the age of three years it makes first-rate stuff for using in Scotland.

Ash and sycamore should be sown this month.

W. W. R.

## IRELAND.

All planting of forest trees should now be finished off for the season as soon as possible. Planting in the nursery should likewise be completed with as little delay as necessary.

Finish all work connected with the pleasure-ground, such as levelling, altering, and making new walks. These works ought to be wound up before the middle of the month, to give time to fill in spaces with shrubs intended for flowering this season.

Cut away undergrowth from among oak to be felled and stripped. Forward all work which may interfere with the bark season.

This is a good time to thicken game coverts by layering. When done during this month rabbits are not so destructive to the work as they begin to get fresh bits of grass from this forward.

It is very important to look over all drains and conduits after the frosts of winter, and remove all obstructions, repairing, if necessary.

As a rule, all planting in nursery and elsewhere should be over by the third week, as, when done after that time, the succeeding growth is always weak and delicate looking.

A great storm of wind passed over Ireland early in February, causing in some districts much damage to timber.

D. Sym Scott.

*Ballinacourte, Tipperary.*

## WALES.

The cutting of hedgerow timber, and the thinning of hardwood plantations (oak excepted) should be finished up as early as possible during the present month. Where oak has to be peeled it will be necessary to have the other cut timber removed at once, so that the ground may be cleared before bark stripping commences. Continue the thinning of coniferous plantations to the end of the month, and young plantations may be operated upon until the men are required for bark stripping.

Owing to the severity of the winter, with the long continuance of frost and snow on the ground, and the wet weather during the early part of last month, planting could not be proceeded with as desired. Under any circumstances the planting of young trees in the open ground should be finished as early as possible this month. The beating up of failures in young plantations should be left to the last, when they will not be so likely to be destroyed by ground game, &c. Where the desired extent of new planting cannot be overtaken in due course, it will be better to leave a portion until the autumn.

The transplanting, and filling up vacant ground in the nursery, will now require attention; and to have the ground in good condition to receive the young plants, it should have been well manured and cleaned last year.

*Kinmel Park.* LEWIS BAYNE.

CORRECTION.—The Auracaria at Portglenone, stated in last month's *Journal* to have a circumference at 1 ft. of 7 ft. 6 in., at 5 ft. of 6 ft. 1 in., should be 4 ft. 6 in. at 1 ft., and 3 ft. 4 in. at 5 ft. I find I made a mistake, having the measurement of some other trees in my note-book.—GEO. DODDS, Forester.

CULTIVATION OF RAILWAY SLOPES.—The project of the South-Western Railway Company to let the slopes on its line for cultivation, reminds me of the fine apple, pear, and I think peach and plum trees in full bearing I saw trained *en espaliers* to hurdles for miles along the line somewhere not far from Agen, ten years ago, when I was on my way to the Pyrenees, and how I regretted the same plan was not pursued in England. Then, too, where cucumbers, melons, pumpkins, marrows, and other sun-loving plants could not be grown for fear of disturbing the soil in their culture, strawberries might be, wholesale, as their perennial roots would tend to consolidate the bank side, and the use which might be made of the now waste flats along our various line sides, to use a French idiom, "goes without saying." When hurrying past the pools and meres resulting from railway excavations, with the water hens and their callow brood mincing to and fro on them too, I have often thought at how trifling cost these waters might be utilized as stews for pond fish, and as abodes and breeding places for more profitable fowl.—H. N. P. W. in *Land and Water.*

# THE HOME FARM.

## OPERATIONS FOR MARCH.

UPON *Arable Farms* this is generally one of the busiest months of the year, and more especially so when the preceding months have been wet or the land has been frost-bound. In such cases arrears of ploughing have to be fetched up and most of the spring corn has to be put in. Where the sowing has not already been finished, get in wheat, oats, peas, beans and parsnips; particulars of which operations were given last month. The land for *carrots* should also be got ready and the crop may be drilled by the end of the month. In 1880 we had a heavy crop of White Belgians, estimated at upwards of 26 tons per acre, from seed sown the last week in March, 6 lbs. to the acre, and in drills a foot apart. The land was well manured and deeply ploughed early in the previous winter, being afterwards scarified, and having about 3 cwt. of super-phosphate of lime per acre. The crop was twice hand-hoed. Mix a little barley or oats with the carrot seed to direct the work of the first hand or horse-hoeing.

*Potatoes* for a main crop should be in during March. By selecting clean seed of early sorts the crop may be harvested before the disease becomes rampant. The dung required should have been ploughed in during the autumn or early winter; but where this has still to be applied, use equal portions of Peruvian guano and super-phosphate.

The *Barley* ground may be got ready, and upon most lands heavier crops may be obtained by sowing in the present month. A shallow furrow upon the land which has been folded off by sheep is about the best preparation, and where clovers are sown with this crop a firm bottom is necessary. The variety of barley called early English requires but about four months to bring it ready for harvest, and for general cultivation no kind surpasses this, though the maltster may prefer the Chevalier. This crop requires clean land, which should be worked in dry weather only. Three bushels per acre will be a good seeding early in the season.

Sow *Seed-beds* with early Drumhead Cabbage, Thousand-headed Kale, and Khol Rabi for transplanting in May: also put in the last winter tares, as for soiling purposes these will yet produce a more abundant crop than the spring variety. Plough or well scarify the land intended for mangolds. Where the crop is sufficiently forward, wheat may be dressed with guano or nitrate of soda, and afterwards be hoed and well rolled down. In order to retain in light lands sufficient moisture for the rootcrops the ploughing should if possible be completed this month.

*Live Stock.*—Horses in full work should be liberally fed. Two bushels of crushed oats or mixed corn per day, with some cut chaff and an allowance of carrots should maintain them in good working order. Mares getting heavy in foal should now have easier work Keep all fatting cattle progressing by giving them extra qualities of food where necessary. Also sell out such as are ready for the butcher. Among the young and store stocks a few mangolds may now be used. More home breeding of herds and less purchasing from abroad would lessen the risks from disease. Ewes will now require great attention and liberal supplies of dry food. Bran or malt dust with chaff, pea haum, or an allowance of hay, will be useful, besides a few roots. Fatting sheep upon turnips and swedes should also have a good supply of dry food.

*Hops.*—All manuring and ploughing or digging should be finished as early as possible, and this will be followed by the cutting or dressing of the hills towards the end of March. During the digging operations as much of the old bine as can be cut off should be burnt up. In dressing the hills great attention should be paid to the mode of cutting and to the working up and removal of all surface runners. Where the hills have been allowed to get too high out of the ground, they may be lowered by cutting back one side each year; but the practice is hazardous and it weakens the growth of bine for the season. As the hills are dressed the strongest shoots should be selected for "stub-sets" to bed out.

*Sainfoin* may be sown this month upon chalky soils or upon sands recumbent on chalk. It will also flourish on loams or clays resting on limestone and upon dry gravels. On some of the poor lands in Norfolk and Suffolk it yields two tons of hay in the year, besides affording good sheep keep. This crop is especially valuable for weakly lambs. Four bushels of the rough seed is sufficient for an acre. It may be sown either with barley or oats, and if the land is clean the seed is better broadcasted. Caution in the choice of seed is especially necessary, as it is seldom free from weeds, especially burnet.

*Meadows* for mowing should have been cleared of stock last month, and such as were then too wet for dragging and rolling may now be gone over. Stone-picking upon young clovers should also be proceeded with. Ten or twelve tons of good rotten dung applied in autumn will have given either grasses or clovers a good start. At this season 1 cwt. of nitrate of soda and 1 cwt. of super-phosphate of lime per acre will prove the best dressing, or about 2½ cwts. of Peruvian guano may be sown.

*Dairy.*—The cows now calving must be liberally fed, have access to good water, and be well sheltered. A fair supply of roots, including some mangolds, should be provided. When these give a taste to the butter, add to every two gallons of warm milk a teaspoonful of common salt or half as much finely-powdered saltpetre before it is put to stand in the pans.

*Poultry* will now want extra attention. Where Cochins are kept the supply of eggs should now be good. These hens will afterwards come in useful to sit upon the eggs of the Dorkings or other later layers. As young chickens are hatched off give them some finely broken hard-boiled egg mixed with crumbs of bread. Afterwards use hemp-seed, the smallest tail wheat, and potatoes mixed with middlings or sharps. Turkeys will soon be hatching off, and the young ones should be supplied with eggs and bread, some curds from the dairy, and young onions chopped up fine, if such are obtainable. Enlarge their range in dry weather as they gain strength, but beware of long wet grass. Geese require less care. A good warm cub to hatch off in and to shelter them by night, and they will very soon shift for themselves. They require free access to water and grass.

*Estate Work.*—This will be confined to clearances of timber and underwood growths, carting manures and composts to gardens and nurseries, and young trees to those engaged in planting up the woodlands. Carting gravel for roads and footpaths and rolling lawns and pleasure grounds may also be occupations of the month. B.

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Abnormal Cone of Araucaria excelsa.—A cone obtained by me of *A. excelsa* from Quinta do Monte, the residence of Leland C. Cossart, in Madeira, presents the following abnormal structure. The scales are seedless, without wings and either inflated or attenuated, floating for days or even weeks in fresh water. In place of the usual central axis there is a small internal cone about 2½ inches in length, composed of normal scales and seeds with, perhaps, exceptionally developed wings. The only noticeable departures in it are that the scales towards the base are larger than the rest, and that there is a deep spiral depression round the lower portion of it as if it had been tightly bound in that direction. On the journey to England, although the scales were more than usually adherent, the scales of the outer cone fell apart. From the pointed projections of the apices of the scales of the inner cone being sub-erect and incurved as usual, it seems that there must have been a space between the two, which appears to have contained a little dried pulpy matter similar to that composing the axis of the normal cone. The outer cone was of full size. Whether the inner cone, deprived of light, would have developed further it is difficult to say, but the seeds, although small, appear to have reached maturity. I have made inquiry, but no similar instance appears to have been recorded.—*Gardeners' Chronicle.*

*The Gardens of the Sun.* By F. W. Burbidge. London: John Murray,
Albemarle Street.
(Second Notice).

The account of our author's visit to Labuan contains a vivid description of its wealth of vegetation: the Elk's-horn fern, growing upon the boles of large orange trees, with its barren fronds like the horns of the giant Irish elk, and the fertile ones fully 7 ft. in length. These, with the epiphytal orchids which had been planted among the branches, made a walk through an orange grove one of a most enjoyable kind. Some idea of the rare beauty of the scene may best be gathered from the author's own words:—"Different kinds of jasmines, ixoras, and hibiscus flower freely nearly all the year, as also does *Thunbergia laurifolia*, which drapes trees and fences, the fire-blossomed pomegranate, and the fragrant oleander; there are also pools filled with the sunshade-like leaves and rosy flowers of the sacred lotus, the beauty of which rivals even the celebrated lotus pools of Japan. One or two honeysuckles and *Jasminum grandiflorum* form tangled masses in the hedges, the pearly flowers of *Pancratium zeylanicum* spring up from the grass, sheltered here and there by caladium leaves, and a scarlet hippeastrum forms glowing masses in old gardens and on waste places where houses have once been situated."

And again:—"Humming-birds, ethereal, gay, and sprightly in their movements, flit briskly from flower to flower, assuming a thousand lovely and agreeable attitudes. As the sunbeams glitter on their bodies they sparkle like so many precious stones and exhibit at every turn a variety of bright and evanescent hues. Some are emerald green, some vivid violet, and others yellow with a crimson wing."

But with all these attractions the country is not a perfect paradise, for alligators infest the rivers and shallow seas, some of them of so huge a size as to seize and attempt to carry off ponies; while deadly green snakes and large brown rock snakes are plentiful. In the jungle may be found boas twenty feet long. Fortunately most of these formidable serpents are sluggish in their movements, so that death from snake-bite is rare. Spiders, too, are seen from six to eight inches across the extended legs, whose webs are composed of threads as stout as sewing cotton, and strong enough to pull a man's hat off; ants an inch in length, and raising mounds five or six feet high; mosquitoes swarming everywhere; and in all the houses multitudes of drab-coloured lizards lining the walls and ceilings of the rooms, and occasionally losing their hold and coming down upon the table with a "flop." The mason wasp and carpenter bee are also found constructing their habitations

—one composed of mud cells fixed against the woodwork of the verandah or roof, and the other boring its hole right into the timber itself. The picture of life among the Murats is completed by a description of their love of gong music, cheap German guns, old tower muskets, spears, blowpipes, krisses or parongs (swords), and their ghastly baskets of human skulls, with which they ornament their dwellings at their periodical seasons of feasting.

"Borneo, the beautiful," is described as inhabited by two races—the Borneans proper and the Malays. Among its animals are the orang-outang, or wild man of the forests, the wild elephant, alligator, the two-horned rhinoceros, wild cattle and pigs in abundance, and several kinds of deer. The Borneans profess Islam, their only literature being the Koran, some poems and prayers and books of tales, and traditional lore in abundance. They are governed by a Sultan, who selects his Ministers of State from among his own relatives. The people are devoting more attention than formerly to land culture, growing rice, kaladi, sweet potatoes, Indian corn, and sago, their implements being of the rudest description. The immigrant Chinaman, armed with a chopper and a blade or two of his national "chunkal" or spade-hoe, cuts the brushwood and piles it around the large trees, and then fires it and brings them down. Next with his "chunkal" he chops up the virgin soil to a depth of twelve or fourteen inches, thus clearing several acres in a month or two, plants his gambier or pepper, and subsists on boiled rice while he cultivates his sweet potatoes, bananas, sugar-cane, egg fruit, maize, and yams. Upon a well-watered bit of forest near a river he builds a palm-leaf hut to live in.

The indigenous products of the primeval forests are fine timber, gutta, caoutchouc, rattans, and camphor. A graphic picture of Brunei, the capital of Borneo, the "Venice of the East," is given, its palm-thatched houses being built on piles so as to be above high tide. The Sultan's palace, or Istana, differs but little from the common dwellings, being decorated with a few old gilt-framed mirrors and silvered goblets, a round table, and a few rickety chairs. Here is a sketch of a scene on the Pandorawan river:—"The scene at sunrise was lovely; every stem and leaf was covered with dewdrops, and the hazy golden mist, through which palms, tree-ferns, and curious leafage of all descriptions loomed out more and more plainly until we saw everything in the foreground quite distinctly. It was a transformation scene on a large scale, and its loveliness was such as only Turner at his best could have portrayed. The delicate arching outline of the nebong palms was sharply defined against the sky overhead, and large masses of a wild musa fringed both banks with immense leaves and clusters of delicate rosy bracts."

In Sulu Mr. Burbidge joined in a royal pig hunt, which he thus describes: "We had dismounted and had stood talking and looking on the parti-coloured scene and swarthy faces around us, when suddenly a cry from the jungle below, a regular chorus of men and dogs, told us that the bristly boar had at last been driven into the open grass to run for his life. Everybody, Sultan and all, scrambled to their ponies, and away we all went, a gay cavalcade truly, down the hillside. Presently the pig came in sight, followed by one or two miserable-looking curs, and half-a-dozen men and boys on horseback, each armed with a long light-shafted spear. We now saw of what sterling metal the Sulu ponies are made. On they came with dilated nostrils, and widely-spread fore feet, scarcely requiring a touch of the reins to guide them as they avoided a jutting rock here, or a half-hidden snag there, and all the time they turned and wheeled as quickly as the hunted pig himself. No European horse would have kept its legs ten minutes on this uneven ground, paved as it was with immense blocks of volcanic scoriæ. These intelligent little beasts seemed actually to understand and enjoy the sport. One young fellow, mounted on a shapely little grey, at length came up alongside the pig. Throwing his hempen bridle on the pony's neck and deftly handling his long spear, he wounded the boar in the side, at which it turned and rushed at the horse, its long white curved tusks gleaming beside its open jaws. Quick as thought the pony avoided him, and ere the pig could stay its impetuous rush, the rider's spear was stuck right through its body at a thrust, the gleaming blade having entered the soil to a depth of several inches. It was killed on the spot. There we were among the tall grass and jungle, and the ever-changing position of the numerous gaily-attired horsemen was a beautiful sight to see. Down below us we could see long files of horsemen wending their way to another piece of covert which the men on foot and dogs were now beating, while, on the little rounded hill above, the Sultana and her ladies formed a bright and picturesque group on horseback (riding *a la fourchette!*), their large vividly-coloured umbrellas standing out clear and sharp against the cloudless sky."

Among the Sulu productions are rice, maize, coffee, manilla hemp, the cocoa-nut of two varieties, tobacco, and tapioca, the deep soil being loosened by a rude plough drawn by a single buffalo. Among its fruits are mangoes, bananas, the fragrant daurian, and langsat. A ride on a large black bull, which our author hired for a bundle of tobacco, which became very restive whenever he got off to shoot a bird or gather specimens, and which could be remounted only after his nose was pulled up to a tree by means of a rattan ring and the steering rope, enabled him to penetrate from Siassi to a high peak, capped with old forest, where, however, he found but few plants to reward his trouble. A visit to some rice fields enables him to describe the implements of agriculture. "The plough was of wood, shaped something like an old English plough in the beam, but with only one handle, and no coulter, wheel, or shareboard. This was drawn by a solitary water buffalo, and rooted up the greasy black earth to a depth of five or six inches. At one side of the field we saw a rude harrow formed of bamboo stems lashed together, the side shoots being cut at about six inches from the stem, and these act as prongs to scarify the soil."

The work closes with interesting chapters on "Tropical Fruits," and "Notes on Topical Travel,"—bathing, medicines, articles for barter, fire-arms, &c., are touched upon. The main objects of the journey were accomplished by the introduction of many beautiful new plants to the

Veitchean collection at Chelsea, including fifty new species of fern—twenty of which are absolutely new to science. The two-spurred pitcher plant—*nepenthes bicalcarata*—was for the first time brought alive to this country. Whether Mr. Burbidge describes native products and manufactures, the manners and customs of the people—the listless ease of the men and the industrious, inquisitive, and attractive manners of the swarthy beauties of the land, he is equally at home in his delineations; and every succeeding page from the beginning to the end of the book arouses fresh interest in these denizens of "The Gardens of the Sun."

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*Die Hagelschläge im Kanton Aargau.* Berlin: Julius Springar, 1881.

This is a treatise on hail-storms in their relation to the contour and forest covering of the ground in the Canton Aargau, by Oberforster H. Riniker, member of the Federal Parliament, based on personal observation and official reports, published by desire of the Council of the canton, and at their expense, of which two hundred copies have been set apart for distribution amongst the officials, schools, and associations in the district.

There is given an orographic and hydrographic description of the region, with a map representative of the mountains and water-courses and lakes; an account of its general meteorological condition, in so far as wind and weather are concerned, with details of a storm which occurred on the 20th and 21st of February, 1879; detailed accounts of previous storms of hail, accompanied by wind or accompanied by thunder, in different districts of the canton; and there follows a discussion of theories in relation to the formation of hail. In connection with this are given observations and expressions of opinion by scientific men of different lands, for comparison with what had been advanced; and the theories which had been advanced in earlier and later times, for comparison with what follows. It may be enough to state here that the theory is based on the co-relation of heat and electricity, and the observed meteorological effects of forests, and the accordance of all of these with the observations reported in the preceding portion of the treatise; and in conclusion it is stated:—"Theory and observation are thus seen to be in perfect accord, and they give us an important indication how appropriately we may, by the regulation of reboisements on the heights, and by avoiding the denudation of dangerous places covered by trees, within a period not very distant, keep off hail-storms from the valleys, and how we may in a perceptible measure moderate the vehemence of what are only storms of rain."

In a concluding chapter, Herr Riniker gives specifications of places and date of severe hail-storms in the district, and the damage done by each, amounting in all to 3,077,383 francs; and alleging that all such damage might be prevented by replenishing gaps in the mountain forests, and like measures of enlightened forest management, he proceeds to specify upwards of thirty localities in the six forest circuits, with the area of each, comprising in all an area of 280 tra., which he recommends for reboisement by the communes interested, or by the carrying out of the Forest Law of the country by which it is governed:—

"Sec. 48. Forests and heights which, according to experience, give protection against hail-storms, shall be so implanted and managed that their existence shall afford as long as possible and maintain that needed shelter."

J. C. B.

*Elementi di Tassazione ed Assesstamento Forestale dell'* Ingegnere Cav. Francesco Piccioli, Professore nel R. Instituto Forestale di Vallambrosa. *Secunda edizione, rividuta ed ampliata.* In Firenze coi tipi dell' arte della stampa ira Pandolfini—14, Palazzo Medici, 1880 (Elements of Forest Taxation and Assessment, by Civil Engineer, Cavalier F. Piccioli, Professor in the Forest Institute of Vallambrosa—Second Edition, revised and enlarged. Florence, 1880.

In previous issues of the *Journal of Forestry* there have appeared notices under the head of "Our Foreign Exchanges" of the successive numbers which have appeared of the *Nuova Rivista Forestale,* published quarterly by the Professors of the Forest Institute of Vallambrosa, under the editorship of Cav. F. Piccioli, Director of that School of Forestry—of *Elementi de Calcolo alle Differenze Finite in Ispeciale Applicazione alla Scienza Forestale,* by Professor Cavalier *Piccioli*—and of *Guida per il colivatore di Vivai Boschivi con cenni preliminari e note sulla Materia Forestale,* by G. M. Adolfo di Béranger, a gentleman bearing the honoured name of the former Director of the Institution at Vallambrosa.

In Italy, as in many other countries, great damage has been done by reckless destruction of woods and forests. The Apennines two hundred years ago were clothed with woods. Now they have in many quarters been stripped of these, and the result there has been the same as that which led to the reboisement of the Alps, the Cevennes, and the Pyrenees—devastating torrents followed the denudation of mountains in France. To the denudation of forest lands in Italy has been attributed increased fury of inundations of the Tiber, the Po, and other Italian rivers. And the only remedy known is the replanting of denuded mountains with trees, and herbage, and bush.

M. Emile de Laveleye, a Belgian writer of note both on political economy and in general literature, in a series of papers which appeared in the *Revue de Belgique,* and which were published last year (1880) in a volume entitled "*L'Italie actuelle; lettres à un ami,*" gives the results of observations during a visit to Italy made by him in 1878, to study there the working of new institutions which had been introduced into the country—and in doing this he gives incidentally a sad picture of the effects of erosion on hills under culture seen by him on his journey from Florence to Rome. The Apennines there are chiefly clay, and naked and bare. They are washed away by the rains; streamlets swell into torrents; ravines are formed; the ground on either side is undermined; the earth is swept away and deposited in heaps at a lower level; and fields are overwhelmed. The results are the counterpart of what may be seen on the western slope of the Alps in perhaps a greater degree. The cause is the same, denudation—and the remedy is the same, reboisement.

In the Pontine Marshes, in the vicinity of Rome, is produced a malaria destructive to life and health by a slight exposure to them. Satisfactory drainage appears to be impracticable, for they lie in a depression far below the level of the sea, and according to minutes of proceedings of the Institue of Civil Engineers (vol. lvii. p. 361, and vol. lix. p. 384) the depression is increasing at the rate of from 5 to 7 inches in a century, and the only practicable remedy for the malaria appears to be the planting of the ground with eucalypti or other fast-growing trees.

The malaria of the *Campagna Romana* commences in June and lasts from that time to the commencement of the rains in September, when it is especially dangerous. During that period the heat is great, and it is deemed madness to allow the entrance of external air because of the miasma; and much would be gained if along with the reclaiming of the land for culture, this evil could be terminated. The monks of the Convent of Tre Fontane, near the Church of St. Paul, without the walls, have made a plantation of these trees, with the result of being able to remain in their convent during the summer, a residence which previously would certainly have been fatal.

The Roman Parliament passed a law for the "benification" of the Agro Romano. It has been laughed at by the *Mercanti di Campagna*, and men of scientific attainments and practical skill have stood in doubt of the results of drainage operations which have been projected; and students of forest science are awaiting with interest the results which may follow the sylvicultural operations which have been projected, and prosecuted with energy and zeal, encouraged rather than otherwise by the laughter of the *mercanti*. These are men of capital and energy, who take in lease the *latifundia* of the Campagna, and either sublet them for the pasturage of deer, horses, and sheep, or cultivate them for corn crops at long intervals of time. And while their experience and observation, quickened by pecuniary profit—for they grow rich rapidly—are by no means to be despised, there is something in their laugh which suggests a suspicion that they foresee that this their craft is in danger.

By this measure, together with proposed operations for the reboisement of mountains, considerable impetus has been given to sylviculture in Italy.

Moreover, there are also still existent in Italy woods and forests of considerable extent, the conservation and management of which, in accordance with the most advanced forest science of the day, has become an object of importance in the eyes both of rural economists and statesmen; and to this may be attributed the importance which is attached to Forest Science in all its departments, and to the efficient operation of the School of Forestry over which Cavalier F. Piccioli presides.

In Italy there is no lack of provision for the higher education of the people. To some it appears that the multiplicity of seats of learning is far in excess of the wants of the population. In Naples, Turin, Padua, Pavia, Rome, Pisa, Bologna, and Palermo, are universities with four faculties—law, medicine, science, and literature—and 440 professors, ordinary and extraordinary, and in round numbers 7,000 students, which is considerably less than there were some few years ago. There are, besides these, nine lesser universities supported by Government, and four universities subject to the same regulations as the others, but supported by the provinces in which they are situated, viz., those of Camerino, Ferrara, Perrugia, and Urbino.

To whatever circumstances—the former divisions of the country or any other—may be attributed the great number of universities in Italy, underlying all is a conviction of the importance of education and instruction, and of securing of these the best of its kind which may be had; and to this conviction, like a substratum underlying all local and special educational arrangements, may be attributed the founding of the Royal Forest School of Vallambrosa, of which mention has been made. J. C. B.

(*To be continued.*)

*The Florist and Pomologist.*—The February number of this serial contains a coloured plate with description of three new double ivy-leaved Pelargoniums, named the "Gaizelle," the "Gloire d'Orleans," and the "Mons. Dubus" respectively, which afford prominent examples of the rapid stride towards perfection made in this class of flowers during late years. The subject of the other coloured plate is the Washington Rath-Ripe Peach, a gorgeous and luscious fruit of American origin, as its name portends, and which gained the first prize at Ludlow Horticultural Show last August, where it created quite a sensation, we are told.

The other articles comprise "Carnations and Picotees, Past and Present." The Editor's selection of the "Best New Plants of 1880;" a continuation of Mr. Barrows' remarks on "Vines and Vine Culture;" "The Otaheite Orange;" "Jasminum Gracillimum;" "Dot Plants for Walk Margins;" "Aquilegias as Frame Plants," and the "Double Tuberose." At the end there is a lot of useful information respecting matters connected with gardening.

## OUR FOREIGN EXCHANGES.

WITH the *Nuova Rivista Forestale* from Italy there has been received a valuable treatise—"On the elements or data required and employed in estimating the cubic contents, rate of growth, and productiveness of woods and forests at successive ages of trees,"—a more extended review of which appears elsewhere in this number of the *Journal.* In the *Rivista* is a paper on the Cause of the Ascent of Sap, by Dr. G. Boehm, of the School of Forestry and Agriculture in Vienna; and details in regard to a new device for testing the germinative power, and the duration of the period occupied in the process of germination of different seeds, by Sr. Lunardoni Agostino.

In the *Revue des Eaux et Forêts* is a report by M. Baraban, of Researches into the Cause of the Decay of Maritime Pines on certain woods in La Vendée, by fungi, occasioning what is known as *la maladie ronde.* It is in continuation of reports made by others in regard to this malady which is at present engaging a great deal of attention in France. A summary of some of those which have appeared is forthcoming if it be desired.

In the *Revista de Montes* is given the text of the Royal Order of the 8th January, 1881, relative to the classification of Crown Forest Lands which may or may not be sold, in reference to a loud protest raised in several of the Journals of Spain some two or three years ago against the sale and consequent destruction of forests, the maintenance of which was deemed necessary because of the influence of forests on the climatal condition of the country.

In the *Handelsblatt für Walderzeugnisse* is the continuation of a paper on the Forest plains of Hungary and their products and a reprint has been received of a paper in the *Centralblatt für das gesammte Forstwesen*, by Forstrath Dr. Nördlinger, respecting experiments and observations on the strength of the elasticity of different kinds of trees, undertaken with reference to the density with which trees should be planted.

From Russia has been received a report of the annual meeting of the Entomological Society of Russia, at which M. Porchinsky made the following remarks respecting the *phylloxera* in the Crimea: "The first appearance of this insect in Russia was in 1870, and M. Charrière, a gardener in Tiflis, was the first to call attention to it. Last autumn M. Danilefsky officially informed the minister of the Imperial Domains of its appearance in the Crimea, and reported that one vineyard had been completely devastated by it. In consequence of this M. Porchinsky proceeded to the Crimea, and having carefully studied the matter embodied the results in a pamphlet which he published, on the Pathological Effects of the *Phylloxera* on the Vine. He stated in his address that the *phylloxera* had come originally from America, but while the *phylloxera* there attacked old roots, the *phylloxera* in Europe attacks primarily the young roots, but does so without altogether neglecting the old. The insect remains dormant in temperatures 10° (Rèaumur) below zero. In spring it assumes a straw colour, casts its skin covering several times, and laying, lastly, eggs numbering from 25 to 50; it dies, and the eggs hatching produce a new generation. In July winged specimens make their appearance, and the cycle of reproduction is renewed. The introduction of *phylloxera* into the Crimea is attributed to some roots of vines imported from France. In the Crimea the vineyards lie along the southern coast, and there the evil has steadily spread. No *phylloxera* has yet appeared in the vineyards on the Caucasus, and the Government has adopted special measures to avert the ravages and the spread of the insect.

J. C. B.

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Seaside Timber.—Seaton Delaval Hall is a striking and a standing refutation of the popular prejudice that timber cannot be raised near the sea. The difficulty now is not the sea-air but the atmosphere first surcharged with coal-smoke, and then supercharged with noxious vapours from the chemical factories. In my younger days, there were many fine healthy trees between the Tyne and the Wear. To the next generation, a thriving tree in Werewickshire will be as great a rarity as in Scotland near Peterhead, where Dr. Johnson said his walking stick might be accounted a piece of timber.

## ELIHU BURRITT'S WALK FROM LONDON TO LAND'S END.

We are indebted to the late Mr. William Gorrie for the following extract from "A Memorial Volume,* containing a Sketch of the Life and Labours of Elihu Burritt," the learned American blacksmith. The following remarks appear in his "Walk from London to Land's End," done in 1864, and from their very terse, as well as correct, arboricultural bearings, as well as showing the varied attainments of that remarkable man, are well worth republishing.

"From Kew Bridge to Richmond, by a footpath close to the River Thames, and winding with its course. Grand old trees put forth their arms over the walk all the way. Palace-like mansions, parks, lawns, pastures and meadows alternate on both sides. An air of hereditary quiet, almost Sabbath-like, pervaded the whole scene, as if the rushing tides of life had all set in upon the great heart of the empire, leaving these suburban sections at low ebb. It seemed unreal and strange to feel the pulse so low and even here, so near to London, that great centre of sleepless and boundless vitality.

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"Richmond Park is studded with trees, many of which are of broader beam than the measure of their mainmasts; oaks and elms, centuries old, with the dimensions of large apple-trees. Two conditions of growth seem to have contributed to this characteristic. In the first place, they were all planted with abundant verge and scope for sidewise expansion, so were not constrained to take the American forest-shape, which was not wanted. Then the soil was cold and watery for most of the year, and hard and chapped during the rest of it. Near the whole surface is still in a rough state of nature, uneven, with upland hummocks, and covered with a coarse, swampy grass. In a few years this wild aspect will be changed. The process of under-draining has already commenced, and large spaces of the great enclosure have assumed a lawn-like evenness and verdure under this popular system of improvement. All these woods and forests in England, whether belonging to the Government or to individuals, have their respective rangers, or head-shepherds, who keep watch and ward over them, trimming, thinning, and planting. Every park has its feeding nursery, in which young trees of every description are trained with care, to go on guard and do duty as sentinels for a few centuries, in place of their superannuated ancestors. Trees that were once unknown in the rank and file of English woods are also being incorporated with the old veterans of the line, and show well in their new uniforms."

N.B.—The "coarse swampy grass" mentioned in the preceding extract, is evidently the *Aira cæspitosa*—tufted, tussock, or hummock, hair-grass, the presence of which is always indicative of stiff, tenacious, wet-bottomed soils, that are uncongenial to tree-growth, and the planting of which should be invariably preceded by "the process of under-draining."

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* Sampson Low, Marston, Searle & Rivington, 188, Fleet Street. 1880.

## MIXED COPPICE IN THE VOSGES MOUNTAINS.

DURING the late snow in German Lorraine, a vigorous onslaught was made on the wolves with great success. Every day several of these pests were tracked and hunted down. Their total extirpation cannot in the meantime be counted on, nor so long as the working system of *mixed coppice* continues customary in the forests of Lorraine. This working system of coppice with an admixture of overshadowing timber trees tends greatly to encourage bushes, shrubs, soft woods, such as willow and aspen, and thorns, which render the underwood or coppice excessively close, and in summer nearly impenetrable. Thus almost the whole forest area provides secure covert and escape for these beasts, allowing them to slink under the thick undergrowth. Some improvement certainly may be looked for from recent forest operations which have been for some time directed towards having the coppice composed more of oak, beech, ash, hornbeam, and the better woods. These allow of longer periods for the coppice and demand for their preservation a thorough weeding out of the inferior woods and bushes. The entire disappearance of the wolves cannot however be expected to precede the change from *mixed coppice* to some form of the *fullgrowth* working system with long periods between the timber harvests. The *fullgrowth* working system, especially in its most advanced and regular form, that with bare clearings and artificial sowing or planting, would restrict the young plantations, enclosures, and thickets, which alone could furnish covert for the wolves, to a minimum of the forest area. In the State forests this conversion has already commenced; but fifty years will hardly see the change completed.—*Koelnische Zeitung*, February 11, 1881.

## THE GROWTH OF LARGE ELMS.

A PROVIDENCE gentleman contributes to the *Journal* of that city an interesting description of the large elms in the neighbourhood, with measurements of their girth and spread of limbs at different intervals of time. The latter facts are of more than local interest, since they give a clue to the rate of growth in old trees. Of No. 1, an uncommonly beautiful tree, the girth at 5 ft. from the ground was, in May, 1858, 13 ft. 11 in.; in June, 1864, 14 ft. 4 in.; in October, 1880, 15 ft. 8 in. Of No. 2, the smallest circumference was, in May, 1858, 14 ft. 9 in.; in June, 1864, 15 ft. 2 in.; in October, 1880, 16 ft. 6 in. Each of these trees gained 21 in. in girth in 21 years. The trees were probably set out in 1748 or 1749. Of No. 3, at about 6 ft. from the ground, the smallest place, the girth was, in May, 1858, 11 ft. 11 in.; in October, 1880, 13 ft. 4 in., an increase of 17 in. in 22 years. No. 4, a conspicuous elm, on Congdon-street, near Prospect Terrace, is, by its situation, symmetry, and magnificent Medusa-like head, perhaps the most remarkable tree within the old limits of the city. Its trunk is quite uniformly columnar. In January, 1858, it measured, 4 ft. from the ground, 11 ft. 8 in.; in October, 1880, 12 ft. 10 in., showing a growth of 4 in. in 22 years. No. 5, perhaps the oldest tree in Providence, measured at the smallest part, between the ground and the branches, 11 ft., and 5 or 6 in. in April, 1858; and 12 ft. 9 in. in October, 1880.

## GOSFIELD HALL.

THE *Gardeners' Chronicle*, in describing this ancient and historical estate, which is situated near Halstead, Essex, says that there is a sad tale to tell about the park, which, originally of 1,600 acres and bounded with a wood of five miles round, was reduced by the plough to 300 acres during the Continental war and the high prices for corn. The boundary woods and beltings still remain, and as a financial undertaking only, the park might now be again extended with advantage. Horace Walpole was quite right in thinking the country too much blocked up. There is, he says, too much wood about the Hall; "it has not an inch of prospect." Walpole liked to criticise a place which others admired. Fortunately there is a fine sheet of water before the south windows of the Hall, securing a bold sweep of 70 unplanted acres.

There were wood-loving proprietors in that Goth-like century, the seventeenth, who would have filled up the lower surfaces of a level country like Gosfield by planting them, if possible; but they could not plant the water, and the water, with its grove of oaks on a bold promontory of the opposite bank, and its graceful outlines and marginal clumps of timber, and its myriad diamonds sparkling on the rippling surface on a fine day, forms the most striking ornament of the landscape seen from the south windows.

The lake was enlarged by Lord Nugent, who was an improver in his day; and as he owned the property forty years from 1736, he must have planted the Weymouth pines and the silver firs, which have replaced the oaks in some of the woods, and are now, at a hundred years old or more, among the finest specimens of their kind. The silver fir is the tree of trees at Gosfield, and the noblest specimen rears its head in the wood called Peg Tantrum's, among neighbouring trees of the same kind almost as tall.

## FOREST DENUDATION IN INDIA.

THE *Indian Daily News*, commenting on the above subject, remarks:— And all this time what, we would ask, is being done to replace the valuable forests? Absolutely nothing. We forget the maxim of the laird of Dombiedykes, "Aye be stickin' in a tree, it will grow when ye're sleeping." The forests of the world, occupying tracts not likely to be used for agricultural purposes, are ample to meet the market demand for timber; but if this is to continue, they must be renewed. Apart from the commercial view of the case, there is the more important consideration as to the manner in which forests affect rainfall. On this there may be a difference of opinion, but only on details; the grand principle is acquiesced in by all, that a reduction of forest land means a denudation of the soil, and thereafter a fitful and deficient rainfall. This, again, means distress and famine. It is easy to renew the forests, if the work be gone about in the proper way. An expensive and scientific Forest Department will never effect it alone, unless some wide and general scheme be devised, whereby the great bulk of the people can be interested in the movement. In India the authorities of some districts in the Punjab have gone the right way about this, and will not fail to be successful. They offer a small sum to the villagers for every tree planted and tended for four years, it being rightly considered that by that time the young tree will be quite able to do without any special care, the shoots being beyond the reach of wandering cattle. Every villager, therefore, who produces a healthy four-year-old tree, receives his reward. The trouble to him is almost *nil* and the guerdon tangible. If this practice were generally followed all over India, a vast improvement would be observable in the climate ten or fifteen years hence. There are immense tracts of land in India, chiefly of a hilly and stony character, which are admirably adapted for forest growth, and which at one time were probably covered with forests. Those should all be planted out with suitable young saplings. The money thus spent would come back to Government with heavy interest in after years. A block of forest is needed in the neighbourhood of each village. From this the labouring man could draw his supplies of firewood, which after a very few years he could do without injuring the forest in any way. The manure, now used in the form of *oopla*, would thus be set free for its more legitimate uses, and in every way we should benefit by the change. This system of village forests need not interfere with agricultural operations, as there are usually large portions of land, such as gullies and gravelly land, which are not well adapted for cereal crops.

## MAHOGANY CULTIVATION IN THE OLD WORLD.

SIR JOSEPH HOOKER states that this may now be regarded as an accepted success. The tree grows well in many parts of India and in Ceylon, and in the former there is a local demand for the wood. In this country new uses are found for it, one of the most recent being for the linings and panellings of railway carriages instead of teak, which is now exclusively used for ship-building. It is not easy to see any valid arguments against the cultivation of a tree the timber of which is of admitted excellence for a variety of purposes, and the growth of which is apparently attended with little difficulty. As late as 1876 the Government of Bengal was adverse to mahogany planting. This policy has now, however, been modified, and in his report for 1878-79, Dr. Brandis, the Inspector-General of Forests, reports :—" Of the exotic trees which are cultivated by way of experiment, mahogany is the most important, and its success seems not improbable, though it is too early yet to form final conclusions upon the subject." Mahogany is also cultivated as an experiment in Burma and the Chittagong district of Bengal. The tree is known to thrive well near Calcutta, and every effort should be made to cultivate it in those forest districts where climate and other circumstances are favourable.

*Bombay, Southern Division.*—Colonel Peyton reports :—" A small parcel of seed was received from the Superintendent of the Botanical Gardens. It was not understood how to treat them, and only 18 germinated. They were put out at Yellápur, and are now splendid specimens, varying from 1 ft. 8 in. to 4 ft. 7½ in. Subsequently another parcel of seed was received.

They are now understood, and are germinating famously. They require much watering, good air and light, and a light covering only of earth."

*Burma.*—Lieutenant-Colonel H. P. Hawkes, Honorary Superintendent of the Government Gardens at Rangoon, reports:—"The mahogany experiment has been an unqualified success. The seeds were sown on the 7th September, 1878. When the plants were exactly a year old three of them were measured, and found to be 8 ft. 3 in., 7 ft. 5 in., and 6 ft. 1 in. in height respectively, with a girth of from 3⅛ to 3⅝ in., a rate of growth which, as far as my experience goes, is altogether unprecedented, even in the case of indigenous trees. In addition to this rapid growth, the mahogany tree appears to be very hardy, and promises to bear with impunity the extremes of heat and moisture characteristic of the Burmese climate. Of the last 112 plants raised from seed not one has failed. We have a large number planted out, and they seem to thrive in the poorest soil, where it is difficult to keep other plants alive.

"I believe that this tree has a great future before it. The Forest Department now plant teak almost exclusively, and there is no other tree which can altogether take its place, especially in those situations where structures made of it are liable to the attacks of white ants. But there are many purposes for which a light handsome wood is required; this want would be met by the mahogany, and there would doubtless be a considerable demand for export."

Major Seaton reports:—"In the Tenasserim Circle, the four mahogany trees planted out in 1875, near a monastery at the foot of the Toungwine, range, near Moulmein, continue to thrive, the maximum and minimum heights of the trees being 17 ft. and 7 ft. respectively."

## THE TIMBER LINE OF HIGH MOUNTAINS.

MR. MEEHAN, in discussing this subject lately, remarked that on the tops of most high mountains we find a total absence of ligneous plants. The highest Alpine vegetation consists for the most part of acaulescent perennials. Lower down we may find some woody species, and often we come to dwarfed forms of trees of species which, still lower down, form forests of considerable height, and which as timber trees make what is known to mountain travellers as the "timber line." Thus in the mountains of Colorado the forests commence at about 7,000 ft. above the sea level, and continue up to about 11,000 ft., where they suddenly cease, and form at that elevation what is there known as the "timber line." On Gray's Peak he found *Pinus aristata*, *P. flexilis*, *Abies concolor*, and *A. Engelmanni*, with some willows forming the timber line. The coniferous trees were probably 30 or 40 ft. high, and it was interesting to note that this tall timber as suddenly ceased as if a wood had been cut half away by a woodman's axe. But at once commencing where the tall timber ceased, the same species exist as dwarf stunted shrubs, seldom exceeding 3 or 4 ft. in height, and often but a foot, though trailing widely over the ground. In this stunted condition the species would often extend some 1,500 ft.

higher up, or half-way from the recognised timber line to the top of the mountain.

So far as he knew, this peculiar timber line has been referred wholly to climatic conditions, of which temperature and moisture have been regarded as the chief elements in producing the results. That admirable botanist and energetic collector, Dr. C. C. Parry, in a paper on the Rocky Mountain Alpine region, published in the "Proceedings of the American Association for the Advancement of Science for 1869," page 249, remarks that the most satisfactory explanation is that the so-called timber line marks the extreme point of minimum temperature below which no exposed phænogamous plant can exist. All that survives above this point does so by submitting to a winter burial of snow, beneath which protecting cover it is enabled to maintain its torpid existence.

The great objection which this purely meteorological view presented to Mr. Meehan's mind was that the dwarfed and gnarled coniferæ extending so many hundred feet up the mountain sides, never produced seed, and we are reduced to the alternative of believing either that the seeds have been carried up the mountain sides in enormous quantities and to enormous distances from the fruiting trees below by winds, or else that there were seed-bearing progenitors of these scrubby pines, beneath the tall protecting branches of which they had their earliest stages of growth. He was satisfied from subsequent observations in the mountains of North Carolina, and in the White Mountains of New Hampshire, that this last view is the correct one, that large timber trees at no very remote period extended much further up the mountain sides than they do now, and that they have since disappeared for reasons presently to be stated, leaving only the younger trees to struggle on as best they may.

Roan Mountain in North Carolina is about 6,300 ft. above the level of the sea. Timber extends to its summit on some parts of it, while in other parts it is destitute of timber for many hundreds of feet down its sides. The species on the summit are *Abies Fraseri*, and *A. nigra*. Oak and other trees come occasionally to near the top, and at about 6,000 ft. he measured a black oak—*Quercus tinctoria*—that was 5 ft. in circumference at 3 ft. from the ground, and was perhaps 40 ft. high. The places destitute of trees were the steep declivities, while those on which the trees were growing were of a more level character. Further down the mountain sides the steep inclines would be clothed with forest growth, as well as those of a more gradual ascent. It is of the summit only that the differences in inclination presented different forest aspects. But in the spaces clear of "Balsam," as the *Abies Fraseri* is popularly known, an occasional one of good size would be seen. In the close Balsam woods, both on the summit and lower down the mountain sides, crops of young plants would be found under the mature trees, but, what was very remarkable, there had evidently been no young trees started till the parents were near maturity. A large area with trees 30 or 40 ft. high would have an undergrowth of young ones a foot or so high, while another area of younger trees would have innumerable small seedlings growing among the damp moss beneath them; and it was further interesting to note that in most cases the crops of young plants in each area were about the same age in each case, as if the seeds in the several locations had all started to grow together in some one particular year, and probably at no other time. On the naked places, where few or no trees were now found, the surface would be closely covered by a matted growth of a grass almost peculiar to that region, *Danthonia compressa,* but a close examination of the surface showed occasional tracts of deep vegetable mould which had been formed by ages of decaying Hypnum or Sphagnum moss, and the evident remains of roots, just as we now find under the Balsam trees; and there is no doubt from these facts that these steep upper declivities were once clothed with trees and mosses, to which the grass previously named succeeded.

With these facts in mind he examined the arboreal features of the White Mountains in New Hampshire. On Mount Washington, which is a little over 6,000 ft., the timber runs up to about 4,000 ft.; while Mount Webster, a mountain forming the southern peak of the same chain, and about 4,000 ft. high, has little timber above 3,000 ft. Clearly, climatic reasons will not account for these peculiarities. On Mount Washington there is much of the same character as distinguishes the forests of the Rocky Mountains. As already noted the timber line becomes marked at about 4,000 ft. For at least another thousand feet we meet with scrubby bushes of *Abies balsamea, A. nigra,* and *A. alba,* with some *Betula papyracea.* Beyond this, and almost to the summit, an occasional specimen of one or another of the coniferæ may be seen. As noted in regard to the Colorado scrubby growth, none of these had ever produced seed; nor was it at all probable, from a careful survey of the locations, that many of the areas could have been seeded by the winds, however strong, bringing the seeds up these mountain heights. Moreover, there were many cases where there were intermediate areas clear of all scrubby spruce plants, and where seeds could be brought by winds in these modern times much easier than to the heights above. Besides this, it was evident that many of these dwarfed specimens were of immense age. Some that he examined were certainly fifty years old, though the stems at the ground were no thicker than his wrist, and, trailing on the ground, occupied but 16 or 20 square ft. of space. There seemed to be but little doubt that at some time in the past Mount Washington had forests of coniferæ at much higher elevations than at present, if not perhaps clean up to the summit; that the scrubby plants now there were seedlings that had sprung up under the older ones, and that in time the older ones were destroyed, leaving the small ones beneath alone to their fate.

An examination of different parts of Mount Washington shows not only that this is the true explanation of the absence of good timber beyond what is known as the timber line, but that the same law is in progress to-day as in centuries past. Illustrations of this are numerous. There is now a railroad running straight up the mountain side from the base to the summit. Near the timber line a cut had to be made through an area covered by mature Balsam firs. This cut was about 8 or 10 ft. deep.

Under the trees moss and dead roots and old fir leaves had made an earthy strata of a foot or, in places, more in depth. The moss was still green from the rains, melting snows, and fogs of this elevated region, and sustaining the various kinds of low vegetation common to these Alpine heights. Young firs were springing up in great abundance. But all the larger trees were dead, though here and there might be seen a branch with a few lingering green leaves. This mass of dead, standing timber occupied several acres. The reason for their death was evident. The railroad cut showed that the forest stood on a mass of large but loose gneiss rocks, through which the waters from the 2,000 ft. of loose rock above rushed as soon as the railroad cut was made, carrying with it all the earthy matter on which the larger trees subsisted, but leaving the tough turfy matter at the surface, on which smaller trees of the same sort may live for many years, though the larger ones cannot longer exist. With the death of the larger trees there is, of course, an increase of light, and then the Hierochloe, with other grasses and sedges, speedily take possession, holding together the loose soil, and even permitting in many cases an increase of the earthy layer, by holding much of the disintegrated rock which may be washed or blown on from above. Carefully examining patches of scrubby spruces above the timber line, it is not uncommon to find dark patches of vegetable mould, evidently the remains of large trees that have been growing where now only the masses of small scrubby plants exist. In some places a sharp stick may be pushed down among the scrubby firs and spruces, and the earth found to be but a foot or so deep over the loose rock below, from which the earth has been wholly washed away. Again, there are some places, often nearly an acre in extent, where the scrubby firs are still standing, dead, from the earth having been washed away from below upwards, not leaving enough for even the moderate demands of these little bushes.

In conclusion, he would say briefly that the "timber line" of high mountain tops results from the washing down of the earth from the higher elevations.—*From the Proceedings of the Academy of Natural Sciences of Philadelphia, September* 14, 1880.

OLD OAKS.—Clarenden Park, the seat of Sir F. H. Bathurst, Bart., near Salisbury, is very extensive and finely timbered with Oak—and such Oak! Amongst the most noteworthy are the "Monarch" and "King John," which are growing within a short distance of the mansion, and measure respectively at 4 feet from the base 18 feet and 19 feet in circumference, and are braced together with iron rods. A short distance from the "King John," on the lawn, in front of the gardener's picturesque and commodious cottage, is another grand specimen (and these in point of size are by no means isolated specimens, inasmuch as the park is principally composed of trees of this description), which, however, is showing unmistakable signs of decaying nature, and in many of the branches the sap has descended never more to rise again. And, again, about 30 yards west of this is another aged monarch of the forest, in every respect a counterpart of the preceding one, excepting that it has not withstood the test of time so well, as it is now in a rapid state of dissolution; yet even in this state one cannot help feeling a kind of reverence in contemplating the wreck of its former greatness.—*Gardeners' Chronicle.*

**New Sardinian Oak.**—Sig. A Borzi describes in a recent number of the *Nuovo Giornale Botanico Italiano* an oak growing in Sardinia in association with Q. Ilex and Q. Suber. It resembles the latter, but differs in the duration of the acorns, and is possibly of hybrid origin.

**Phenomenal Trees.**—There was a few years ago, and probably is still, a curious specimen at Bicton, in the vicinity of the Hermitage. A large tree of the common oak, about 8 ft. or 10 ft. from the ground, divided into several branches, and from the fork sprang a young thriving beech, which overtopped the oak, and grew vigorously, the roots having, in all probability, found their way through the interior of the trunk to the soil. Growing from the same place was a mountain ash, apparently quite at home, as it did not only appear to be thriving, but flowered and fruited freely. The top of this tree, therefore, was beech, lower down beech and oak, and still farther down the mountain ash stretched out almost horizontally.—*Garden*.

**Effects of the Gale**—The late gale committed great havoc among the trees in the vicinity of Bray. In Old Connaught-avenue and the fields adjoining twenty-five magnificent elms came down; several fine trees fell at Palermo, and at Old Connaught Hill about one hundred monarchs of the wood—some of them of great age and beauty—were overturned. At Shanganagh Castle the steward counted one hundred and ten trees stretched on the ground; and in Powerscourt deer-park an immense number were blown down, the principal cause of all this devastation being that the recently frozen earth had just become loosened by the thaw and rain, when the gale came in all its fury, and easily overthrew trees which, under ordinary circumstances, would have successfully resisted its greatest power.

**An Epping Forest School.**—Mr. G. S. Boulger writes as follows in the *Garden:* The woods and forests of England are a source of public and private profit. It cannot be denied that much of our too extensive waste lands might be planted with timber. There is not, however, in our islands any institution devoted to the training of foresters. Those required for our Indian empire are sent at a considerable expense to be trained in France. I have elsewhere urged that the Government should at least subsidize a school of forestry, which might be affiliated to the University and Arboretum of the city of Edinburgh. It cannot be denied that our most able foresters, like our most successful gardeners, hail from the land that Dr. Johnson taunted with having to import its walking-sticks. Still the claims of Edinburgh do not, I think, necessarily militate against those of Epping, which I confess that, when writing in the *Journal of Forestry*, I overlooked. Scotland is geographically within the belt of Conifers; England in that of deciduous trees, Quercus Robur mingling in the south with Quercus Cerris, the Beech, and the more southern Chestnut. The soil of Epping Forest is perhaps better suited to broad-leaved trees than to Conifers; but the London clay, Bagshot sands, chalky boulder clay, glacial gravels, and the brickearths and gravels of the Thames and its affluents afford a considerable variety in this respect. There is here a real forest and no mere arboretum. The proximity to the metropolis would afford important facilities in the way of economically securing the services of competent teachers of the sciences cognate to practical forestry; and last, but not least, we have a wealthy and public spirited corporation to whom we can apply to carry out the scheme, or at least to take the initiative in the matter. However, as a British school of forestry has been talked about for some years, it is about time something was done about it.

THE HEMLOCK SPRUCE.—Someone has been praising greatly, and justly too, this tree for its use in indoor decoration, vases, &c. It reminds us that the tree makes a very close hedge near Philadelphia and other cities in America, and that the pendulous habit of the young shoots makes it form a singularly pretty hedge. We are not quite sure of the conditions that suit it best in this country, and want to know where the finest are. They are, some people say, at Strathfieldsaye, though we have not seen them. Some good trees are also reported to be at Bowood. As seen in many places it is usually dwarfed and stunted—at least, compared with the specimens one meets with a description of in American writings.

THE FROST AND CONIFERS.—We read as follows: "Another terrible year for the fashionable conifers. The poor Wellingtonia seems sadly scorched about London, and in truth it is no great loss, for this much-overpraised tree is one of the poorest in form that we have ever introduced. The young state appears to be the only one in which we can enjoy it in this country, and in that state it is generally a poor object. And yet people make avenues of this. It is sad to think of the number of places that have been spoiled by dotting this and other tender conifers over the gardens and parks, actually making avenues across the best part of the grounds of such worthless and untried trees, as regards the country generally." Few will dissent from what is here stated. We—all who have taken any interest in the question of trees—have seen sad sights after our severe winters, which are the true test of whether trees are fitted for our climate or not. At the same time, the noble hardy deciduous trees, which are wholly neglected or forgotten, may be seen as careless as usual of the effects of our climate, as, for example, at the present time at Sion.

THE UPAS TREE.—Prominent among the plants recently received at the Melbourne Botanical Gardens, from Dr. Schomburg, director of the Adelaide Botanic Gardens, is the *Antiaris toxicaria*, the celebrated Upas tree of Java. The fabulous poisonous properties of the Upas tree were first circulated by a Dutch surgeon named Foersch, who, according to Dr. Masters, stated "that the tree grew in a desert tract, with no other plant near it for the distance of ten or twelve miles. Criminals condemned to die were offered the chance of life if they would go to the Upas tree and collect some of the poison. They were furnished with proper directions, and armed with due precaution, but not more than two out of every twenty ever returned. Foersch states that he had derived his information from some of those who had been lucky enough to escape, albeit the ground around was strewn with the bones of their predecessors; and such was the virulence of the poison that there are no fish in the waters, nor has any rat or mouse, or any other vermin been seen there, and when any birds fly so near this tree that the effluvia reaches them, they fall a sacrifice to the effects of the poison. Out of a population of 1,600 persons who were compelled, on account of civil dissentions, to reside within twelve or fourteen miles of this tree, not more than 300 remained in less than two months."

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# EDITORIAL NOTES

FOR some time it appears that no small uncertainty has prevailed in regard to the uses to which the new Arboretum at Edinburgh is to be devoted, and the Council of the Scottish Arboricultural Society, rightly deeming the subject of great importance to the country and to the future wants of forestry, held a special meeting on the 12th of last month, at which a memorial to the Government was drawn up and approved of, embodying their views upon the subject, and clearly pointing out the many advantages to be derived from the Arboretum, as a primary part of a comprehensive scheme of educational and scientific forestry. The memorial being addressed to the First Commissioner of Her Majesty's Board of Works, a deputation was appointed to wait on Mr. Shaw-Lefevre in support of the views expressed in it. The day for the interview having been fixed for Tuesday, March 22nd, the deputation comprised Mr. Hutchison, of Carlowrie, Vice-President of the Society, Dr. Cleghorn, formerly Conservator of Forests in Madras, who represented the importance to India of a provision being made in this country for the study of forestry, Dr. Croumbie Brown, late Government Botanist at the Cape of Good Hope, who showed the great importance of the matter to the future welfare of our colonies, and about a dozen Scotch members of Parliament, including the Lord Advocate, Mr. James Cowan, Mr. J. D. Peddie, Mr. J. Pender, Mr. P. M'Lagan, Mr. A. Grant, Mr. R. W. Duff, Mr. C. Tennant, Mr. J. A. Campbell, and Dr. Farquharson.

The deputation was introduced to Mr. Shaw-Lefevre by Mr. Cowan, the senior member for Edinburgh, who presented the memorial, the text of which our readers will find printed on another page.

In explaining and supporting the memorial, Mr. Hutchison referred to the present state of the Arboretum, and said that, while the object of the deputation was not by any means to propose any restriction on citizens' privileges, they were very desirous that the Board of Works should supply what seemed to be an omission in the arrangements, of proper security being taken for the scientific purposes of the ground being kept prominently in view. The grounds should not, it was urged, be laid out as a mere public park, but they should, on the contrary, be treated with the scientific and systematic grouping of trees which, while making the place valuable for students of forestry, would in no way interfere with the use of the grounds for recreation. Mr. Hutchison further suggested that the Arboretum should be placed in the same relative position to the Botanic Gardens at Edinburgh as the Arboretum and Gardens at Kew stand to one another—the regulations for the Kew Arboretum providing that visitors are subjected to certain conditions of admission, such as that no perambulators shall be allowed in the grounds, that no picnic parties shall be held, and that the gates be open on Sundays from two o'clock in the afternoon till sunset. After Dr. Cleghorn and Dr. Croumbie Brown had also spoken in support of the memorial, expressing the great difficulty at present experienced in finding young men properly trained and educated to be able to pass examinations for service abroad, Mr. Shaw-Lefevre assured the deputation that it was his intention that the Arboretum should be turned to scientific uses, that it should not be converted solely into a public park, and that, after full consideration of the subject, such rules and regulations would be framed, and submitted to Parliament for approval, as would be calculated to secure the desired object.

Since the matter in doubt has been thus settled, in accordance with the object for which the ground was obtained, it is to be hoped that the Government will take up the subject with more energy than has been displayed in the past, and have the ground arranged and planted without further delay, in the manner suggested in the memorial. The regulations and arrangements for the use of the Arboretum by the public must be framed so as to meet the educational facilities which it now appears it is intended by the Government to afford to the students of forestry. And although no doubt a considerable step in the initiatory progress for the establishment of what may be called the nucleus of a School of Forestry in Scotland has thus been gained, and tangible material found upon which to base so important an institution, it will behove the Council of the Arboricultural Society to keep the matter steadily in view, and to press it to a definite result by every means in their power. They will, no doubt, receive the hearty co-operation and assistance of every member of the Society, amongst whom are many influential Peers and Members of Parliament. Foresters, and the country generally, are meanwhile grateful for what the Council have already done, and the thanks of the Society are due to those gentlemen composing the deputation which has so promptly and satisfactorily acted in the Society's behalf on the recent occasion.

In our short notice last month of the publication of Miss E. A. Ormerod's valuable report on "Notes of Observations of Injurious Insects," 1880, the necessities of the press did not permit us to do more than merely draw the attention of our readers to it; and we hope that they have profited thereby by a perusal of the report, which can be had through any bookseller in the country at the moderate cost of a shilling. The contents of the report are specially interesting to the farmer and the gardener, from the copious details given of the methods which have been found successful in exterminating many of the pests of the farm and the garden, or, at all events, in lessening the severity of their attacks. Nor are the insects which affect the labours of the arboriculturist overlooked by any means; and although they occupy but a subordinate position in regard to the number treated of, we are confident that it is only because their life histories are less understood, and that their damaging attacks are more seldom noted by the forester, than those which affect the crops of the garden and the farm. For this deficiency of knowledge it is not easy to find a satisfactory reason, because the crops of the forest are in every way as valuable to the owner as those of the farm or garden, and any injury done to them is of a more permanent and costly nature, and cannot be retrieved in a season or so, like similar injury done to the cereal and root crops. Like everything else of the nature of a science pertaining to forestry in this country, forest entomology has been thoroughly neglected as a branch of the education of our foresters, and many able men acutely feel the want of even the rudiments of a science which would enable them to distinguish between their insect friends and foes, in their daily avocations. Such knowledge as we possess of the subject is either contained in ponderous and expensive works, quite inaccessible to any practical forester, or is of such a learned and technical nature as to preclude its application by ordinary men to the incidents that occur in every-day life.

A considerable portion of the information we at present possess of the nature and habits of insects injurious to forest trees has been acquired from foreign sources, particularly from the German works of Ratzeburg, Kriegelstien, Köllar, Beroldingen, and others, but which, in the different nature of our climate and varying seasons, is not well adapted for practical use in this country. Hence the great necessity there is for a handy treatise on the subject, got up from the experience gained of insect life and habits in our own forests and plantations; and we are much gratified to learn that Miss Ormerod has undertaken the preparation of a "Manual of the Remedies and Means of Prevention for the Attack of Insects on Food Crops, Forest Trees, and Fruit," mainly compiled, in its remedial and preventive sections, from the experience and observations of practical men actively engaged in waging inveterate war against those insidious pests. As the authoress states, the plan of the work will be to give a short account of the commoner kinds of insects, amounting in all to about a hundred, which are found to seriously injure the food crops, forest trees, or fruit of this country, with the means found practically useful for their prevention or remedy; each subject being accompanied by good illustrations of the insect in its various stages, and the mischief wrought by it.

Our attention has been called by Miss Ormerod to the great want there is of a more complete record of the life histories of many of our forest insects, in which their habits, and the dates of their various stages of development, should be accurately given. This is a subject upon which most foresters could render some service, by observing and noting the nature and habits of any of the numerous insect pests which are found to be infesting almost every plantation and forest in the country. In the report before us, the notices of the ravages of the Pine Weevil (*Hylobius abietis*) and the Pine Beetle (*Hylurgus piniperda*) afford much instructive information, and possibly we have not much more to learn about them, and the equally destructive Pine Sawfly (*Lophyrus pini*); but the life history of many of the more minute insects, which are no less deadly in their attack on trees—such as the vast hosts of aphides, scale insects, mites, beetles, "bugs," and "blights"—is in most instances but obscurely known to us, and an accurate delineation of their life and depredations is greatly to be desired. Even the life history of the widespread and destructive Larch Aphis is still but meagrely ascertained in this country, and it, along with others equally important from an economic point of view, will form a good subject for careful study and close observation to those who are anxious to have these matters clearly investigated and accurately described, for the benefit of the country and their fellow-men. Vast injury is suffered, and much valuable property wasted and destroyed, by ignorance of insect life and the lack of accurate knowledge of the best means to prevent insect attack on vegetation, and to help to clear up the subject ought to be the aim of every observant and intelligent man.

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The spread of knowledge in any profession in these times must to a great extent depend on the literature devoted to its history, culture, and exposition. Without recognised standard treatises of the various branches of a profession, a student is like a ship without a rudder. In no profession or branch of industry is this more felt at the present day than in Forestry in English-speaking countries. The amount of rudimentary literature which we possess is at the best but fragmentary and unconnected; and almost nothing has been done to connect and codify it, so as to form a systematic treatise which could be put into the hands of a student of forestry, stating principles and practice in a perspicuous and intelligible form, which he could easily understand, and make the best use of. In the higher branches of the science the deficiency is even greater still, for there we cannot point to a single work specially written to meet the wants of a student of forestry. To these facts more than any others, perhaps, is to be attributed the reluctance displayed by our Indian authorities to make an effort to train at home the candidates for appointments in the Indian Forest Department. However, a time has come when the deficiency in English forest literature must be made good, and now that the want is becoming known to those who have the knowledge and ability to supply it, we may anticipate a rush of learned and comprehensive works upon every branch of the subject.

Almost every continental State of any importance possesses a rich and abundant forest literature, and innumerable treatises have been written in the languages of these States upon every branch of the science and practice of forestry. In France, Germany, Spain, and Italy these works abound, and many of them of great value might easily be translated into useful English manuals to supply a pressing want,—until such times as standard works can be produced to specially meet the wants of British Forestry.

Among our latest exchanges from India, we find that an excellent and praiseworthy attempt is being made by an officer of the Indian Forest Department, Mr. E. E. Fernandez, to translate into English a valuable work on Forest Organization, by Charles Broilliard, Professor of Forest Economy, Nancy, France. This work, entitled "Cours d'Aménagement," has been recently published by M. Broilliard, and is designed to supply a text-book for the students attending the course of lectures on forest organization and working, in the Forest School at Nancy. It is not meant to take the place of the lectures, but only to furnish the student with a convenient summary, which the lectures will expand and illustrate. The summary is, however, so perspicuously written, and so well connected in all its parts, that it is perfectly intelligible by itself, and gives a clear and sufficiently complete idea of Forest Organization as it is understood and practised in France.

The work is being issued by the Bombay press, and in the first portion, which is now before us, the translator has been most successful in rendering the original text into terse and intelligible English. Each phrase and idiom is clearly expressed, and every French term for which there is no equivalent in our language is carefully explained, or Anglicised as far as the nature of it will permit. Much care and intelligence are displayed in carrying out the work, and when it is completed it will form a most useful manual of study for aspirants to a prominent position in modern forestry.

With the pressure of bad seasons and the poor returns obtained for farm produce, many of our agriculturists are casting about them, to see if they can discover a more genial climate and prolific soil, where their labours and anxieties will be better rewarded. Some make choice of one or other of our prosperous colonies in the southern hemisphere, others prefer Canada and other parts of British America, while a good many proceed to the fertile lands of the United States, where, by industry and hard labour, they generally succeed in acquiring a fair share of the comforts of the world, and sometimes amass considerable wealth. For many years the Western States have been the most attractive to the agricultural emigrant from this country, but some of the older settled States hold out equal if not superior attractions, especially to those possessed of a little capital. Of these, Illinois is one in which an Englishman feels most at home; as its climate, soil, rural society, and social affairs, approach closer to those of the old country than probably any other State of the Union In many points of importance to the agriculturist the climate and soil are superior to ours, and the markets are most favourably situated for the sale and export of the surplus produce of the land, so that the farmer is able to calculate with a fair amount of certainty upon realizing a good profit from the fruits of his labour.

An interesting circular is annually issued by the Illinois Department of Agriculture, giving copious details and statistics of the crops raised in the State, and the progress of agricultural affairs during the season. The Circular, No. 72, giving an account of "Illinois Crops for 1880," is now before us, and contains so much of special interest to the agriculturist, that we would recommend a perusal of it to our readers, as being one of the best criteria within their reach, by which they can judge of the prospects of a farmer at home, compared with those that await the emigrant in one of the most attractive and best of the agricultural States. We do not presume to advise in the matter, as each must judge for himself whether the facts detailed in the circular offer sufficient inducement to entice him to remove his home to the Far West; we merely call attention to the contents of the circular because it is from a trustworthy source, and not compiled for the sake of promoting emigration. Its facts and figures are modestly stated, and give by no means a roseate hue to things for any special purpose, but simply to disseminate accurate information.

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Of all our numerous colonies scattered throughout the world, South Australia is displaying the most praiseworthy anxiety for the preservation and extension of its forest lands, and has taken a decided lead in inaugurating a scheme of forest conservancy, under State control, which is certain to confer immense benefits on the colony in a comparatively short period. Considering the amount of enthusiasm thus shown in arboreal matters by the colony, and the skilful manner in which the public taste has been encouraged, and its wishes carried out by the colonial authorities, it is not surprising that the citizens of Adelaide, the capital of the colony, should desire to lay out and embellish with choice trees the numerous "Park Lands" which intersect and surround the city. With this object in view, they have obtained the able services of the Conservator of Forests for the Colony, Mr. J. E. Brown, F.L.S., who has drawn up an exceedingly interesting report on the subject, a copy of which is now before us. Mr. Brown enters fully into the details of an excellent scheme for the laying out and planting of these Park Lands for ornamental and recreative purposes, and grasps the subject in such a thoroughly comprehensive manner that leaves little to be desired but to see the scheme completed in its entirety.

The Park Lands of Adelaide comprise some fifteen different portions of great extent, but varying much in individual size. Distributed along the banks of the river Torrens, and throughout various parts of the city, they present great capabilities for ornamental planting with the best effect. The undulating nature of their surface and the great variety of soil and aspect which they possess enable the planter to introduce numerous varieties of choice trees from various climes, which possess great interest to the arborist, and add the richest sylvan beauty to the landscape. Portions of these Park Lands have already been planted in a manner displaying little knowledge of trees, or taste for handling the subject; the trees planted being chiefly *Eucalypti*, which are not particularly ornamental in general, and quite out of place when employed in quantity for such a purpose. These and other trees that are unsightly, or tending to decay, are recommended to be gradually removed, and their places filled up where necessary by more beautiful trees of a suitable nature.

Besides special selections of trees for avenue planting, and for planting on particular soils, Mr. Brown gives a list of above one hundred species of ornamental trees which he considers suitable and well adapted for general planting in the Parks for their landscape effect. These include most of the choicest ornamental conifers from Europe, Asia, and North America, as well as oaks, elms, maples, poplars, willows, planes, and other deciduous trees from the northern hemisphere, the greater number of which are said to be already growing and thriving well in the Adelaide Botanic Garden.

Full instructions are given in the report for the laying out and planting of the whole of the Park Lands. A tastefully designed plan or sketch accompanies the directions for planting each portion of the lands, from which a good idea can be formed that the scheme is admirably adapted for the intended purpose, and when completed the city of Adelaide will possess the finest series of richly-wooded public parks of any city in modern times.

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The increasing difficulty of procuring a sufficient supply of charcoal for metallurgical uses, at a moderate cost, is a question that is pressing upon the attention of iron manufacturers in various countries in which the supply of timber for making charcoal has become exhausted or unable to meet the demands. It is found to seriously interfere with the profits when the charcoal has to be brought from a distance; so much so, indeed, as to put a stop to the iron industry in certain districts where the forests of the neighbourhood have become exhausted and the supply of charcoal has to be imported. This is now being felt to a considerable extent among the iron industries in some of the older States of America, where the luxuriant indigenous forests have long been ruthlessly destroyed, and the supply of timber so utterly exhausted that sufficient cannot be found for the making of charcoal to meet the wants of the iron furnaces, and the cost of its carriage from a distance has reached a point which the manufacturer cannot afford to pay. Charcoal being a necessity in the manufacture of iron of the best quality, it follows that the industry will be driven out of its present locations, if means are not immediately taken to restore the forests in the various districts, so as to produce a permanent supply of wood for the purposes of the manufacturer.

At a recent meeting of the United States Association of Charcoal Iron Workers, at Harrisburg, Pennsylvania, the Hon. F. B. Hough, Chief of the Forestry Division, United States Department of Agriculture, read an instructive paper on the importance of giving timely attention to the growth of woodlands for the supply of charcoal for metallurgical uses. He pointed out the evils arising from the past and present waste of timber in the mining regions, the scarcity of which in many places in the older settled States has driven away the iron forges and furnaces, which could no longer be worked with profit after the woodlands which supplied them with charcoal had been cut down and the ground devoted to other purposes. This, he says, has now become a subject which should arrest the attention of every thoughtful person, and lead to a serious consideration of the measures that should be taken to prevent the injuries which must inevitably result to the national welfare if the present system of careless waste is allowed to go on much longer. He then goes fully into the subject of forest regeneration, and ably shows that by proper management it is capable of supplying in a permanent manner an abundant supply of charcoal for the iron furnaces, besides furnishing timber and fuel for the wants of the neighbourhood. This excellent address should bear good fruit among those interested in these industries.

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FROM the Annual Report of the Director of the Arnold Arboretum, near Boston, U.S.A., we learn that much excellent work has been done during the past year, under the able direction of Professor C. S. Sargent, towards establishing that valuable institution on a proper basis for the purpose of arboricultural science and education. Until certain negotiations with the city of Boston are settled, in reference to the extent and future uses of the Arboretum, the work of laying out the ground, and finally arranging the specimen trees in systematic order for educational purposes, cannot be proceeded with; but in the meantime the thinning of the original woodlands, with a view to their gradual renovation with young and vigorous trees of the proper kinds, and the work of enlarging and improving the nurseries, is being energetically pushed forward; and several important additions have been made to the various collections of trees, shrubs, and other plants, and specimens for the Herbarium and Museum. The plants and seeds interchanged with other establishments in all parts of the world have been 3,151 plants and 409 packets of seeds distributed, and 3,081 plants and 524 packets of seeds received during the year. The Museum is intended to illustrate the economic properties of both native and exotic trees, and already contains, for reference, a large collection of dried and prepared plants, besides some 1,755 specimens of wood, cones, tree-fruits, and other articles of interest to the arborist. Among the specimens of woods are many collected by Professor Sargent from North American trees, and a fine collection of 350 specimens of the woods of India, Australia, Tasmania, &c., presented from the Herbarium at Kew, through Sir Joseph Hooker, Director of the Royal Gardens. A library of books on Dendrology, and kindred subjects, has been begun, as an essential adjunct to the proper working of the Arboretum; and a record is being kept of the time of flowering of trees and shrubs, native and exotic, in the vicinity of Boston, to which other notes on kindred subjects are added. The work in these departments has been pushed on with great energy during the year by Mr. John Robinson, who gratuitously acts as assistant, and by whom the report on the Herbarium and Museum is drawn up.

The report is accompanied by a well-executed plan of the proposed Arboretum, showing the extent of the ground contributed by Harvard College (120 acres), and by the city of Boston (48 acres), in all a total area of 168 acres, giving ample scope for the display of great taste in designing its outlines and landscape features, and in arranging with proper skill its vast treasures of arboricultural gems and rarities. The ground to be occupied has a considerable extent of original woodland upon it, which can be utilized in some measure in preserving the sylvan aspect of the place, till such times as the choicer and better habited trees grow up and take possession of the space allotted for the display of their characteristic habits and natural beauties. The wormlike road or walk, wriggling through the plan, is an objectionable feature which ought to be rectified in the matured scheme, as no doubt it will be. The whole, when complete, will form one of the finest arboretums in the world, and will furnish the centre for a Forest School, in connection with Harvard University, which will occupy an important part in the future history and prosperity of the United States.

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WE learn that the following gentlemen were selected at the recent competitive examination for training for appointments in the Indian Forest Department. The number of marks shows the relative position attained by the candidates in the examination, but we are unable at present to give the standard maximum and minimum marks required by the rules of the examination, nor can we tell the number of candidates out of which the six successful competitors were selected:—

| Names. | No. of Marks. |
|---|---|
| Mr. H. W. Kays | 3,439 |
| ,, F. A. Lodge | 3,419 |
| ,, H. P. Sheil | 3,026 |
| ,, T. P. Peake | 2,918 |
| ,, H. L. Leresche | 2,797 |
| ,, J. S. Pigot | 2,715 |

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LOMBARDY POPLAR.—Mr. J. Cornhill writes in the *Garden* as follows:—"Few trees have afforded me more unfeigned delight than this, and I wish that every one could see it as I have done at home, where it exercises a powerful influence upon the landscape. Those who may have worked up the Seine from Havre to Elbeuf will have seen the Lombardy poplar in all its glory, in its full dignity of growth, and where its characteristic features are brought into the boldest prominence. There amongst the most delightful scenery this tree finds its true place. Here and there, clustered on small islets, the column-like masses of dense dark foliage rise boldly above the water level, sometimes pushing out from amongst a tangled irregular undergrowth, occasionally in close association with various round-headed trees—large willows, elms, &c., frequently tree and alone, either in groups or as isolated specimens, the huge boles touching down to the water's edge, the somewhat rigid outline being clearly defined against a blue sky, or the white chalk cliffs in the background. Something must of course be allowed for surroundings, which are here of the character best fitted to show off this tree to the best advantage, but are there not many low-lying situations in this country of a similar character, where the free use of the Lombardy poplar would break up the tameness and uniformity which often prevail there? Our English sylvan scenery, lovely as it always is in its quiet peaceful beauty, is apt to become insipid, owing to the prevalence of trees which naturally throw themselves into rounded-off masses of foliage. The Lombardy, with its erect spire-like growth, bold, rigid, but not too rigid outline, breaksu p this informity most happily. The fact of the tree growing with rank vigour in swampy, ill-drained soils, is of itself enough to recommend it, and I would therefore say to all concerned in planting, don't forget the Lombardy poplar.

# Thinning Plantations.

By C. Y. MICHIE, Forester to the Earl of Seafield, Cullen House, Banffshire.

Practical forestry may be defined as signifying the growing of the greatest quantity of the most valuable wood or timber, upon the smallest piece of ground, in the shortest period of time.

To grow a large quantity of wood is a very desirable thing, but the operations of forestry may, and often are, so conducted as to increase the quantity at the expense of the quality. We have all seen large bulky trees, so coarse and knotty, and open in the grain, as to be unfit for use. Scots fir, for example, grown on rich loam is of such rapid growth as to render the wood useless for anything except fuel. Quantity alone is, therefore, no index to good forestry, but when combined with quality the case is essentially altered. The largest and best are certainly qualities sought for in a tree, and I hope to show how they are attained.

If thinning were rightly understood and attended to, pruning would be almost unnecessary, for it is either superabundance of room on the one hand, or too little on the other, that produces most of the necessities for pruning. I shall endeavour briefly to show how far and to what extent thinning is necessary to produce the desired results of practical forestry. I have stated that quantity is required—I mean quantity of timber, not number of trees—for while it is true that two sixpences are of equal value to one shilling, it does not follow that two small trees are of equal value to one large one. Two trees containing 20 ft. each may be of as much value as one containing 40 ft., but two trees containing only 10 ft. each are not so valuable as one containing 20 ft., or two containing 5 ft. each, so valuable as one containing 10 ft.

The following is the system of thinning I practice, and which, after a trial of many years upon an extensive scale, I find attended with such favourable results as to inspire me with confidence to pursue it.

The first example I will take is an enclosure of 500 acres, and between six and twelve years planted—the youngest part six and the oldest twelve. It is situated between 500 and 800 ft. above the level of the sea, and covers both sides and top of the hill, which extends north and south.

The exposure is open on all sides to severe winds, but most so on the north and east, which slopes towards the sea, which is distant about four miles. On that side all evergreens, including the Scots pine, are seriously injured by the sea air in winter.

The plants are composed of Scots pine, larch, and a slight mixture of Norway spruce and silver fir.

The quality of the soil and subsoil varies considerably, but consists chiefly of a mixture of sand, clay, and gravel, less or more inclined to moor pan as a subsoil. The natural herbage consists of heath, some parts whins, with grasses indigenous to such soils.

With such an extent of plantation before me, I had to consider well what course to pursue with the thinning. I saw that to allow such an extensive plantation to grow to any considerable height before thinning would be attended with disastrous consequences; and in order to avoid this, I commenced work on all parts where the trees had attained 6 to 8 feet high, and cleared openings, or shooting roads as they are termed. The roads are laid off 100 yards apart each way, thus dividing the whole plantation into squares containing 10,000 square yards each. The making of the roads was done by contract, the open space specified to be 16 feet wide, and all trees, heath and whins, to be cleared off and thrown clear of the sides at least 3 feet. The trees, heath, and whins, all to be kept separate, and laid in small heaps amongst the growing trees in such a manner as not to injure any of them.

I recommend making all the roads straight and parallel with each other, as far at least as the nature of the ground will admit. The advantage of the parallel straight roads is also experienced during the cover shooting, by affording the beaters the opportunity of coming into line at the end of every 100 yards, and the roads themselves determine the distances at which the guns are to be placed. Straight and parallel lines of roads are recommended, but cannot always be carried out in practice. Roads leading up-hill must of course be curved or serpentine, and as no road can be led through a morass or swamp, or over a precipice, all such places must be avoided, and this cannot be done without deranging the plan of squares and straight lines.

The work of thinning is proceeded with according to the size of the trees; and here special attention should be paid to their height. As a rule, I thin when the remaining crop stands six to eight feet high, at which period they should be about eight feet apart, or say 700 on the acre. I know this practice is called in question by some, and condemned by others, and few approve or practise it. On these and other accounts I am all the more desirous of giving reasons, and stating my experience of the work. First, an active man with a proper hook or hand-bill, which is the only proper implement I know of for such work, will thin an acre in two days, and this represents about six shillings per acre added to the original expenditure, and must be charged against it. The thinnings at this stage I put no money value upon. They are mostly collected and carted away by the tenantry and others; but the cost and labour of collecting and clearing are so great, that no money is charged for them, except a small sum for such as are on the margin of the plantation, and convenient to clear. The second reason for thinning at this early period is in order to give the remaining crop full freedom and liberty to develop their lower branches. It is those branches situated upon the lower part of the stem of the tree that supply food and nourishment to the roots, and unless they are preserved vital at this critical period, it very soon ceases to develop itself and make wood properly. In fact, it ceases to grow to anything like satisfaction at the very time when it should be making wood faster than at any other period of its history. It should always be kept in mind that the loss of every lower branch of a young tree is just a corresponding loss of roots, and loss of roots is loss of growth.

To the preservation of the lower branches of the celebrated larch forests of Athole more than anything else, may be attributed their successful growth. The larch were planted six feet apart, that distance admitting all the lower branches to grow three feet in length before touching; but as many of them no doubt died, the trees would thereby produce their lower branches twice that length, hence the unparalleled results of the growth of the larch in those forests.

Having witnessed so much injury inflicted upon young plantations, some even entirely ruined, by the lower branches being interfered with too early, I would direct in the strongest possible terms the special attention of all who have the management of plantations to this particular aspect of the subject. It is often asked what rule can be given, and how it may be known when either individual trees or plantations have the exact and proper quantity of branches upon them. The rule for this is, as far as any rule can be given, to maintain a due proportion of girth to the height of the tree, and these proportions are girth in inches to feet in height. For example, a tree twelve feet high should girth a little above the swell of the root twelve inches; a tree twenty-four feet high, twenty-four inches, and so on up to thirty or thirty-five feet in height, to a corresponding number of inches in girth. When trees attain the above height, thinning should be discontinued, and frequently not prolonged after the trees are from twenty to twenty-five feet in height, but allow the plantation to grow undisturbed (except by cutting down dead or decaying trees) till it is ripe for cutting and clearing.

That there is a danger of trees having too many, as well as too few, branches I fully admit; but there is no danger if the rule given be observed, for there will be no superfluity of branches at any time, since, if the proportional girth is too great, it can soon (if there are sufficient trees upon the ground) be reduced.

Having found out by careful study that a well-proportioned and properly-balanced tree measures as many feet in height as inches in girth, I was further anxious to know what proportional weight the branches of such trees bore to the stem on which they grew, and in order to ascertain this I cut down, in the process of thinning, some fair specimen trees of the following species, and, after carefully weighing them, I found the following results:—

| Species of Tree. | Age. | Height. | | Girth. | Weight of stem. | Weight of branches. | | |
|---|---|---|---|---|---|---|---|---|
| | Years. | ft. | in. | inches. | lbs. | st. | lbs. | oz. |
| Larch ... ... ... ... ... ... | 19 | 27 | 0 | 20 | 91 | 1 | 11 | 0 |
| ditto ... ... ... ... ... ... | 10 | 13 | 6 | 14 | 23 | 6 | 4 | 0 |
| ditto ... ... ... ... ... ... | 7 | 4 | 4 | 3¾ | 1½ | 0 | 0 | 12 |
| Norway Spruce ... ... ... ... | 10 | 10 | 6 | 8 | 12 | 0 | 2 | 0 |
| ditto ... ... ... ... ... ... | 7 | 4 | 3 | 5 | 2¼ | 0 | 2 | 0 |
| ditto ... ... ... ... ... ... | 7 | 4 | 5 | 5¼ | 2 | 0 | 1 | 4 |
| Scots Pine ... ... ... ... ... | 36 | 27 | 5 | 30 | 224 | 12 | 3 | 8 |
| ditto ... ... ... ... ... ... | 26 | 20 | 4½ | 22¾ | 89¼ | 6 | 5 | 0 |
| ditto ... ... ... ... ... ... | 20 | 15 | 5½ | 13 | 27 | 1 | 0 | 0 |

The height and girth in the above table are not exactly proportional, as it is very difficult in making a selection to find them so, but the approximation is sufficiently near for the purpose of showing the requirements of practical forestry according to my definition. The form or outline of the tree up to that period when thinning should be discontinued should be conical or tapering, both in the stem and general form of the tree. After thinning is discontinued the shape of the tree alters, both in the stem and branches; the latter wither and fall off, till only the top part is covered, and the former gradually changes from a cone to a cylinder. The cause of the latter change is in the increase of woody deposit in proximity to the live branches and the decrease of it where the branches have withered and fallen off. During this stage of growth, in dissecting a tree, it is found that the zones of wood near the vital branches are much thicker than at a distance from them, and the further distant the thinner they are. Every possible effort should be made in the thinning of plantations to preserve the proper quantity of live branches upon each individual tree, for if once the vitality is destroyed the best future skill will be defective in restoring it. Another reason for early thinning is in order not to check the growth of the trees, for it must be borne in mind that the immediate effect of thinning is to check the growth of the standing trees, and this is done in at least two different ways.

It is very consoling to be told that if thinning is done *gently,* no evils will result from it. The most gentle mode of thinning that can be practised is to cut down one tree that stands too close to another. If many such trees are cut, the thinning may be termed severe; and if only a few are cut, it may be termed gentle. With words and terms, however, we may do as we please, but with the effects produced upon the standing tree, by removing one that stood close by it, and for whose sake it was cut down, we have some inquiries to make. When two trees have grown up side by side for many, or it may be only a few years, they have formed such an affinity for each other that separation becomes a painful ordeal, so far as trees can be supposed to sympathize with or feel for each other. Whether trees are affected through feelings or not is of little importance, since it is certain they are influenced in other ways, namely, mechanically and chemically. That thinning injuriously affects trees both ways, there is little or no doubt; and we shall first see how they are injured mechanically. When two trees grow near each other the branches on the confronting sides are less developed than on the opposite sides, and the roots underneath are developed in a corresponding manner; and if one of the trees is removed by thinning, the whole of the weak side of the remaining tree is exposed suddenly, and the wind acting upon it strains the tender roots to such an extent as often to uproot the tree altogether. But apart from actually uprooting and blowing over the tree, the roots are strained and fractured so severely that they less or more lose their vitality. Any injury inflicted upon resinous trees, whether upon branch, stem, or root, is succeeded by an accumulation of resin, and this, when it occurs to the roots, is fatal to them, as it obstructs the sap vessels and stops circulation.

From observing the sickly aspect of a very extensive plantation after being thinned, and being called upon to assign a cause for it, which I was at the time unable to do, I turned my attention to the subject, and, after much labour, concluded I had solved the problem. All species of trees did not present the same sickly appearance, nor did the same species on all soils. The Scots pine was of all others the most sickly, especially upon the hard gravelly soils, and the larch least affected of any. Of all forest trees the Scots pine is most impatient of any artificial interference, and suffers more from thinning than any other species. In this case, after thinning, the trees lost their natural dark green colour, and assumed a faint light green. The leaves became shorter, and presented a clustered appearance. Some foresters, on giving their opinion upon it, said it required more thinning, that the crop was too great for the poor gravelly soil to bear, some thought it blighted by some atmospheric influence, and others said it had attained maturity, and ought to be cut down.

After weighing all arguments, and duly examining the whole case, I came to the conclusion that the thinning, and thinning alone, had done the mischief. From a very wonderful provision in nature, the branches of a tree are so spread out as to shade the surface of the ground underneath which the delicate tender roots are spread, and thus keep them uniformly cool, and never at any time scorched or unduly heated by the direct rays of the sun. A plantation, therefore, like that under consideration, which had grown up till about forty years old, without ever receiving a regular thinning, may well be understood to have so far adapted itself to its circumstances as to be seriously and injuriously affected by any change such as thinning. The trees—including stem, branch, and root—were what may be termed acclimatized, or rather habituated, and therefore thinning produced a change upon them equivalent to removal to a different soil and climate.

There is much said about acclimatizing plants, which applies only to that part above ground, but there is little or nothing said about the roots of the plants, although the latter are equally as important. Now, in a pine or fir plantation grown upon a dry gravelly soil, with the roots extended and ramified all over, and within an inch of the surface of the ground, is it either unreasonable, strange, or unlikely, that when a sudden opening is made by cutting one or more trees, and letting in a stream of sunny rays to heat or scorch the delicate, sensitive roots, so long nursed, protected, and shaded under a canopy of branches—is it strange, I would again ask, that a change should take place with the roots of the trees, or that the heat of the sun should crystallize the fluids in the roots, and stop the flow of sap which was wont to nourish the tree? To this chemical change in the roots I attribute the sickly appearance referred to.

Another Scots fir plantation was thinned at about thirty-five years' growth, and had not been thinned during the preceding fifteen years. After thinning it became sickly and death-like, and, but for the important place it occupied in the landscape, would have been all cut down. It, however, was allowed to stand, and after the fourth or fifth year began to resume its natural colour, and is now in a fair state of health. After a few years the trees usually recover, as the result of having made new roots suited to their new condition of life; but, while some recover, others go back and perish altogether.

From the foregoing results, it must appear obvious that thinning is a very delicate and precarious operation, and is attended with much danger and risk—to a crop of Scots fir, at least. If thinning could be entirely dispensed with, so much the better, and in the case of natural forests, where no artificial thinning has ever taken place, there are to be found many hundreds of acres of wood which few or no artificial forests or plantations can compare with in point of value. Any one who has examined the forests on Balmoral, Invercauld, and Mar estates, or Rothiemurchus, Glenmore, and Abernethy, on Spey, and many others, both at home and abroad, will support that testimony. One piece, of a few acres, on Rothiemurchus estate is worthy of special notice. When I examined it, a few years ago, the trees stood on an average 9 feet apart—some of them as wide as 15 feet, and others as close as 2 feet. The market value of it per acre at the time I saw it, allowing the trees to be all sound—which I am certain they were not—was at least £300 per acre. The ground itself is the poorest possible—a light, sandy gravel, with a crisp, dry herbage of heath and moss, certainly not worth over 1s. 6d. per acre per annum for grazing purposes.

The question here arises, how are plantations to be managed that have been so thickly planted as to require thinning to prevent the trees from growing up disproportionately small? The answer is, thin early enough, and complete the operation before the side branches touch each other, and before any of them decay. This is advisable, not only for the preservation of the branches themselves, but in order that no unfavourable change be produced upon the roots of the trees by admitting a degree of heat and air amongst them to which they have not been accustomed, and which they cannot endure.

Most plantations under thirty years old may be benefited by thinning if the trees have sufficient branches; but where they have stood so closely together as to destroy their vitality to two-thirds their entire height all hopes of restoring them is at an end, and if any thinning is done in such cases it does not improve but injures the crop, by retarding its growth.

All thinning, I would again repeat, should be commenced before the side branches touch each other, and continued till the trees stand about 8 feet apart, after which they may very safely be handed over to Nature to perfect and complete their growth, the forester meanwhile only to cut and remove dead or sickly trees till the crop is ripe, when it should be cut.

All that has previously been said about thinning applies only to pine and fir plantations; and now a few words about hardwoods.

I have an extensive hardwood plantation under my care which had never been thinned up to twenty years old; it consists of oak ash, elm, beech, sycamore, lime, &c. At the age of twenty it received a moderate thinning, and from that time to the present (twenty-five years) it has received every possible attention. Some of the trees are over 1 foot diameter, but the greater part are not quite 6 inches, and some not even 4. The soil is good, chiefly of a loamy nature, and a good depth.

The remarkable disparity of growth amongst the trees impressed me with a desire to know the reason why some are so large and others so small, being all of the same age, and grown on the same oil. The explanation is evidently this:—those that were confined, and thereby deprived of their lower branches, are the small ones, while those that had ample room are the largest.

It is a common impression that hard-wooded trees, though denuded of their branches when young, will recover them after being thinned. That such is not the case I have ample proof of; for here there are hundreds of trees as bare as poles, with only a tuft of branches on the top, which have had ample room for many years to develop their side branches, had it been in the order of nature for them to do so. Some trees—as the oak—do make an effort to reproduce their lateral branches, but when the effort at all succeeds it is at the sacrifice of the top growth, so that what is gained on the one hand is lost on the other. It is very difficult to know how to treat a plantation successfully that has once been neglected in thinning. Cutting down and allowing a new crop to grow from the stools, is sometimes recommended; but this plan is attended with at least one very serious objection, namely, the circumstance that the scion springing from an old stool produces a tree in character, form, and habit exactly like the parent from which it springs. A dwarfed and stunted tree produces one dwarfed and stunted, and so on. Since, then, so very little can practically be done to recover neglected plantations, the greater is the necessity for preventing them from going wrong.

To all rules there are exceptions, and to this the larch appears to be so; for, of all others, the larch gains most by thinning, and suffers least from it. It is very impatient of confinement, and enjoys freedom and liberty, although they come even late. On bare, pole-like trees I have seen lateral branches formed and developed beyond anything I have witnessed in any other forest tree. Unless the trees are sound and healthy, however, no lateral growth will take place by thinning.

The system of thinning young plantations for profit is very objectionable. Not that there is any wrong in disposing of the thinnings to the best advantage; but the profits spoken of as derived from thinnings have done much to mislead proprietors, and induce them to injure, if not ruin, their woodlands. I saw a plantation lately which had been thinned for pit props, and it was sad to see most of the fine grown and best proportioned trees cut down, and the coarse and weakly ones left as the crop, many of the latter so weakly that they could not sustain their own weight. A report set forth this plantation as an example of profit, and showed that it yielded, as thinnings in a given time, from £8 to £10 per acre. The same report should have stated how much such thinnings had reduced the value of the plantation. On some estates a large revenue is derived from what are termed thinnings, although the plantations are so thin already that they are suffering from it. I know young Scots pine plantations being thinned containing only 300 trees per acre, and some also containing only half that number. Thinning is a very general term, and is understood and practised very differently. Cutting down the tender sapling as a weed of a few years growth is termed thinning, and the operation of felling *all but* the last tree of the matured forest is known by the same term. The two greatest errors amongst foresters are being too late in commencing to thin, and continuing the operation too long. It does much good if done early, and equally much harm if done late.

"The most valuable crop of oak timber I ever saw," says Mr. J. S., an extensive timber merchant, "was upon the Duke of Devonshire's property, where the trees stood 6 to 8 ft. apart." The best the writer ever saw was a few acres of Scots pine on Rothiemurchus estate, Strathspey, already referred to, where the trees stood from 2 to 15 feet apart.

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A Curious Oak Tree.—Among the ruins of the wall which formerly surrounded the Abbey of Beaulieu, stood an oak, contiguous to a part of the wall, and extended one its principal limbs in close contact along the summit of it. This limb, at the distance of about three yards from the parent tree, formed a second stem upon the wall, by shooting a root into some fissure, in which it probably found a deposit of soil. This root, running along the bottom of the wall, and finding some crannies in it, rose twice again through it, and formed a third and a fourth considerable stem, each at the distance of about three yards from its neighbour. The fourth of these stems shot a branch again along the summit of the wall, and in close contact with it, forming a fifth stem in the same manner that the parent tree had formed the second. This last stem was again making an effort on the wall to extend this curious mode of vegetation still farther. In a great storm which happened in February, 1781, a part of the wall was blown down, and those two stems with it which were nearest the parent tree. Each of these stems was about four or five feet in diameter, and the timber of them was sold for 30s., which shows their bulk was not trifling.

# The Planting of Trees in Over-proximity to Dwellings.

By D. T. FISH, Hardwick, Bury St. Edmunds.

This is a fault of long standing amongst us. Scarcely was a mansion erected than the landscape gardener was called in to hide it as much as possible by trees. Whether this arose from defects in our architecture, or love of trees, or the mere prevalence of fashion, it would be as difficult as useless to determine. That the system of planting up or out dwelling houses prevailed, we have ample proof in thousands of existing examples. Neither was it always approved. As early as the year 1580, we read that when the Queen visited Grindal, Bishop of London, at his palace at Fulham, she complained that he had so surrounded his house with trees that she could not enjoy the prospect from her chamber windows. Of how many country mansions the same complaint might be made at the present day. Trees are crowded close around the house as if no other place could be found for them, the result too often being to mar the architectural beauty of the dwelling-house, and at the same time destroy the grandeur of the trees. Most buildings are doubtless improved by the support of trees, but that support does not mean that the trees are to butt up against the house, or lean against it, as a lame man leans on his crutch. Trees at a considerable distance may support or clothe an architectural structure far more effectively than those placed against it.

Architects certainly ought to be ashamed to erect buildings that need screening out, or hiding up. The deceptions practised under the pretence of screening are totally unworthy alike of the science of architecture and the art of arboriculture; villas are screened out from gardens a few yards square, and small fortunes have been squandered in making pretence that such gardens were surrounded by woods, though within a dozen yards of the front door of the house; and as for stables, of course they must be hidden, though on what principle of convenience or taste never did appear. But such toyish art is more excusable in small places, where even deceptional enlargements, where no real ones are possible, may be allowed.

But perhaps over-planting in close proximity to dwellings is most frequently met around mansions on great estates. How often on such one has to exclaim that, neither the landscapes nor the woods can be seen for the trees. Trees hug the house round as with arboreal swaddling-bands, and all the foreground is so planted up that one has to pry and peep to get the merest glimpse of the distant landscape, or glean the faintest notion of its extent, variety, or beauty; peeps cut through a veritable jungle have been adopted as a childish compromise between the false art which shuts out the charming distance and the natural desire of cultured taste to command as broad a view as possible of all worth seeing in the surrounding landscape; peeps, however useful as tentative expedients, are far too tame and artificial to be permanently satisfactory. It would be far better, in most cases, to boldly clear away most, or all the trees contiguous to the house, and open out those remaining into groups or clumps, thus bringing into full and prominent view all the main features of the immediate foreground or the distant landscape. This cutting-out of landscapes needs, however, more taste, skill, and care than the planting of them in. The character of the climate, the direction and force of prevailing winds, and many other things, must be taken into consideration; but, properly managed, with judgment and taste, there are no landscapes so satisfactory as those which may be thus cut out. They possess one great characteristic and advantage over those formed by planting—the latter take years to form and finish; the former may be made in a day. True, a few or many ill-placed trees may have to be sacrificed, but the loss may virtually double, treble, increase a hundredfold, the number of those that remain, and quadruple the effect and the beauty of every one of them. And even were it otherwise, the mission of trees is to serve, not master us. I love trees as much as most people, but have little sympathy with that dendrologous idolatry that refuses to remove a tree because it is old and big; the bigger it is, the greater the nuisance, if badly placed. The place of trees is to minister to our pleasure and convenience, not to stifle us in our homes by their dark shadows, shroud in gloom the glorious light of the sun, vitiate the purity of the air, and shut out, by their impenetrable and innumerable green shutters, the far-reaching, ever varying beauty of the surrounding country.

# The Valuation of Standing and other Timber.*

BY D. F. MACKENZIE, FORESTER, &C., MURTHLY CASTLE, PERTHSHIRE.

THIS is a subject that may be of interest to some of the old, as well as to many of the young foresters; and is thoroughly understood by comparatively few. Notwithstanding the rules given by various writers on arboriculture, there are but few of these rules applicable to any extent, and are for that reason ignored by most practical foresters and wood merchants, expecially by the latter.

Woods in Scotland are offered for sale in various ways—sometimes by number, sometimes by area, and not unfrequently by the cubic contents. When offered for sale by number or by acre (area), the number of the various kinds of trees are given, and the buyer has to find out for himself, as he may, their value and for what purpose the timber in question is best adapted; and by this means the wood merchant finds out what sum he can offer for the wood standing on root, or otherwise, as the case may be. The forester, however, has little to guide him but precedent.

Many people value with very little ceremony, and with surprising accuracy. Timber merchants or their managers, and a good many foresters, can value an extensive tract of standing timber by walking backwards and forwards through it several times, and taking "here and there" a proof of quantity. All that is necessary for these persons to know to guide them in their calculations is the number of each kind of trees in the plantation—*i.e.*, so many larch, spruce, Scotch fir, &c. This style of valuation may be called valuation by induction. The method is simple, and may appear to the reader very easy. So it is, but it can only be acquired by long practice and experience. Others value by what may be called comparison. This is to say, a wood on the estate of A has been sold for, suppose, £65 per acre. The proprietor of the estate of B has a few acres of apparently similar wood to sell, and on that account expects the same per acre as A got, and feels dissatisfied if he is offered a few pounds less per acre. The wood merchants see, however, that although the trees are of about the same size, and in appearance similar in every respect, yet that the timber is also more dense, and thereby much heavier, more difficult to manufacture, and a little more distant from the market, amounting in all to perhaps 2s. per ton more cost than the same appearance of wood on the estate of A, thereby reducing the value by at least £10 per acre. The reader will see by this that valuations by comparison are not at all to be recommended.

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* We may mention that this article was in our hands before the publication of the article on the same subject in last month's *Journal*.—ED.]

In order that the forester can value by induction (assisted of course by any details he may be able to gather), he must pursue a course of training to be able to do so satisfactorily. I shall here mention a few things that it is necessary to know, before one can value with any degree of certainty.

All foresters should know what the wood they intend to sell or value is adapted for at the time of valuing, where the best market can be got for the wood in the manufactured state, and the price that can be got for the same at the place of consumption. From this price, deduct cost of transport to that place, cost of felling and cross-cutting, carting to and from saw-mill, sawing, rent, taxes, and interest, and the value of the wood standing will be got. Another very important point is to know the quantity of rough timber required to produce a given quantity of sawn timber. This latter is regulated by the thickness of the saw used in cutting up said timber. No. 14 may be said to be a medium size. The use of a thicker saw will be a decided loss to the wood merchant, and that of a thinner as decided a gain, $\frac{3}{16}$ is a good allowance for a saw draught generally, including extra thickness for shrinkage. It will not be difficult, therefore, to calculate the loss by sawing, &c., in any given quantity of timber.

For the sake of example we will suppose that a forester has got instructions to sell a certain wood, composed principally of fir timber. On inquiry, he finds that 1-inch fir deals and half-inch staves are the ruling commodity of the market; and these give at the place of consumption 95s. and 45s. per 1,000 superficial feet respectively. The first operation is to count the number of trees in the various lots to be offered for sale. The next operation is to take proofs by measurement of a number of trees of various sizes throughout the plantation, and by this means to find as near as possible the mean cubic contents of each tree in the lot or lots. This is done by running a tape round the base of the tree, breast high, adding to the result 21 inches for the second measurement at 6½ inches diameter at top. This divided by 2, will give the mean girth, which again divided by 4, will give the side of the square (always giving the usual allowance for bark), and the side of the square, multiplied in the usual way by the ascertained height of the tree, will give the cubic contents, less the top, which is generally in average woods suitable for pit-wood. The net value of the pit-wood is generally added to the total value of the cubic contents of the whole lot.

The whole cubic contents suitable for deals of one inch, and also the contents suitable for staves being ascertained, it will not be difficult to find the superficial area in each given quantity. Thus, in 1,000 superficial feet of inch deals, there are $83\frac{4}{12}$ cubic feet, to produce which, 100 cubic feet of rough average timber is necessary. In 1,000 superficial feet of half-inch staves or deals there are $41\frac{8}{12}$ cubic feet, and it requires 58 cubic feet of average small timber to produce that quantity. Any other thickness can be ascertained in the same way.

Let us suppose a wood to contain 3,460 trees, having an average cubic contents of $12\frac{1}{3}$ cubic feet, $\frac{2}{3}$ of the whole is suitable for 1 inch deals, the remaining $\frac{1}{3}$ for $\frac{1}{2}$-inch staves. 100 cubic feet makes 1,000 superficial feet of deals, valued at 95s.; the working expense being 21s. 6d. 58 cubic feet makes 1,000 superficial feet of $\frac{1}{2}$-inch staves or deals, valued at 45s.; the working expense being 16s. What is the value of the wood standing?

The whole contents are $3{,}460 \times 12\frac{1}{3} = 42{,}673.3$ cubic feet, and of this $\frac{2}{3}$ make deals, *i.e.*, $\frac{2}{3}$ of $42{,}673 = 28{,}448.8$, and $\frac{1}{3}$ makes staves, *i.e.* $\frac{1}{3}$ of $42{,}673.3 = 14{,}224.5$

Now, 100 cub. ft. : 28,448.8 cub. ft. : : 1,000 sup. ft. : 284,488 = sup. ft. of deals, and 58 cub. ft. : 14,224.5 cub. ft. : : 1,000 sup. ft. : 245,250 = sup. ft. of staves.

The value of the deals is 95/- less 21/6 working expenses—nett 73/6

The value of the staves is 45/6 less 16/- working expenses—nett 29/-

Therefore, 1,000 sup. ft.: 284,488 sup. ft. : : 73/6 : £1,045 9 10
value of deals; and 1,000 sp. ft.: 245,250 sp. ft.: : 29/- : 355 12 3
value of staves.

To this add the pit-wood, 30,000 cub. ft. at 25/-
per 1,000 lin. ft. ........................................ 37 10 0

The value of the wood standing is therefore £1,438 12 1

It must be understood that the above prices or costs are not necessarily correct, but are given proportionately, for the sake of example only. The system can be extended and applied indefinitely and to any class of timber, and I consider it the most accurate of any system known to me.

# A British School of Forestry: Present Position of the Question.

By the Rev. J. C. BROWN, LL.D.

A good many years ago *Punch*, in one of his cartoons, represented a patient angler seated in the stern of a punt on a canal in a pelting shower of rain, looking intently at the swivel on his line, and replying to a passing friend, who knew he had been so engaged for hours, and asked of him, "Have you caught anything to-day?" "No; but I have had some glorious nibbles!" and this represents, not inaptly, the results of the advocacy of the organization of a British School of Forestry. There have been some glorious nibbles at the proposal or suggestion, but thus far no such institution has been founded.

One of the subjects enumerated in the prospectus of the *Journal of Forestry*, among those to which attention would be given, was "the advantage of establishing National Schools of Forestry," and the first leading article, or, as it is designated, "Editorial Note," with which the first number broke ground, called attention to the matter at some length. I had some three weeks before addressed to the Lord Provost and Magistrates and Town Councillors of Edinburgh, to the Office-bearers of the Scottish Arboricultural Society, and to the promoters of the purchase of ground at Inverleith to be transferred to Government for the formation of an Arboretum, and others, a pamphlet, entitled, "The Schools of Forestry in Europe, a Plea for the Creation of a School of Forestry in connection with the Arboretum at Edinburgh;" and in the first number of the *Journal of Forestry* this pamphlet was reviewed, and lengthened quotations from it were given.

In the numbers for May and June, in the following year, admittance was given to a paper by me entitled, "A British School of Forestry: Review of Suggestions Relative to its Formation." In the succeeding volume in the numbers for June and July appeared a second paper, entitled, "A British School of Forestry: Review of Opinions Expressed Relative to the Expediency of its Formation," followed in the numbers for August and September by one entitled, "Rural Primary Schools of Science, Agriculture, Forestry, and Rural Economy."

These papers have been cited to render unnecessary the repetition of anything said in them in proof of continuous attention having been given to the subject, or of any views advanced in them, or even facts adduced in support of the same, except in so far as an alteration in the state of things consequent on the advance of time may seem to render an allusion to them necessary; but even such allusions will be few in number.

The main difficulty with many has been to see how a forest could be secured for the practical training of students in forest work. Now there appears a possibility of this difficulty being overcome. If it be so, the whole question of school training may receive now an amount of attention which has hitherto been withheld from it. And in the altered circumstances a curriculum somewhat simplified from what was submitted by me for consideration four years ago may prove satisfactory, either in its entirety, or modified, as circumstances may suggest.

It was, I presume, the difficulty anticipated in procuring a forest for the practical training of students which prevented the scheme proposed by Dr. Robert Brown, and mentioned in the *Journal of Forestry*, vol. ii., pp. 35—38, being entertained by many.

In the first editorial article in the *Journal*, that cited above, it is said, vol. i. p. 9: "It is necessary for a properly equipped Forest School to have a large extent of forest attached to it, having a variety of elevations and soils suitable for the profitable cultivation of all our hardy trees, besides the garden, nursery, or arboretum which forms the nucleus or head-quarters for the school. By proper arrangements, such an extent of suitable land could be got within easy reach of Edinburgh, along the slopes amongst the glens, and upon the Pentland Hills, or, if for a school in England, amid the uplands of Surrey and Hants, or among the hills of Derbyshire, or in Wales, where trees thrive to perfection, and the land is of comparatively small value for any other purpose."

Similar views extensively prevail; and they demand attention from those who would advocate the establishment of Schools of Forestry in Britain, even though they may not share them. And it is with pleasure that I see a possibility of this difficulty being removed.

In the number of the *Journal of Forestry* for December last, reference is made (p. 490) to the proprietor of an estate in Midlothian being willing to feu to the Government, at a low rate, a highly eligible and conveniently situated piece of land, stretching from the environs of Edinburgh to the top of the Pentland Hills, for experimental purposes in arboriculture, agriculture, and horticulture. It is stated that the land in question comprises a great diversity of soils and aspects, suitable for the growth and cultivation of all kinds of trees, and a burn, or watercourse, which affords a plentiful supply of water, and which could easily be made to form a highly attractive as well as useful object in the landscape. It is stated, further, that it presents a considerable range of altitude, rising from about 200 feet above the level of the sea to a height of about 1,600 feet.

In the succeeding number—that for January last—there is reported (p. 556) a suggestion made by Mr. Alexander Mackenzie, superintendent of Epping Forest for the Corporation of London, that a School of Forestry should be established in connection with that forest, for which, he says, there is a combination of circumstances which seems to tend to a hope of success; and in the number following—that for February—there is given (pp. 673—676) the text of a memorial presented by him to the Epping Forest Committee of the Court of Common Council, in which he unfolds his scheme—a scheme which in all its details is well deserving of serious consideration, as are also observations made in support of his suggestion. But that to which I specially desire to call attention here is the following:—"You possess about 6,000 acres of land, all more or less forest, neglected, detached, and inharmonious in effect by reason of its having been, from circumstances well known to you all, so very much subdivided, that an effort must be made, as soon as the outlying portions are restored to your care, to blend them all into one harmonious, albeit diversified, whole; consequently the land must be carefully surveyed, and mapped out accurately, in order that a reliable plan may be obtained on which to work out a scheme which may guide the Conservators of the forest for all time; and, lastly, that much planting, and the careful thinning and pruning of existing trees, must be judiciously prosecuted for many years." And it is added:—"The execution of all these works would form the best possible groundwork for the practical training of the foresters in the future." And in the programme of study which he submits, he says:—"If the course of study should extend over four years, the first two to be spent at Epping Forest, where the trees have been neglected for so many years, it will be the object of the staff to organize order and produce regularity out of disorder and chaos; the third year should be spent in the New Forest, which is a tract of sufficient extent, having over 60,000 acres, and which, having been in Government keeping, may be supposed to be a further advance and development of the principles pursued by the student during his first two years at Epping; the fourth year should be spent at Windsor, where may be seen the full development of the principles commenced by the student at Epping. After this course of training, those pupils who have diligently applied themselves to their studies during the four years should be drafted off to other fields of usefulness, either at home or abroad."

Should either of these suggestions be carried into effect the difficulty in question would to a great extent be met.

I am given to understand there is no immediate prospect of the offer of the feu in the immediate vicinity of Edinburgh being accepted; but I consider that all that is required in connection with instruction in a School of Forestry might be secured by suitable arrangements in conjunction with and in accordance with what has been suggested by Mr. Mackenzie.

In the *Journal of Forestry*, vol. i., pp. 756—761, 837—842, is an article reporting the "Opinions of Continental Foresters on the Creation of a School of Forestry," from which it appears that, while there are amongst students and professors of forest science in Germany some who hold that it is expedient that Schools of Forestry should be located in forest districts, the numbers who hold that it is preferable they should be connected with universities and like collegiate schools for the study of science, greatly preponderate. But I speak advisedly when I say that the latter party, perhaps to a man, would advocate the spending of a lengthened time annually throughout the curriculum in properly conducted excursions and forest work in forest districts more or less distant from the school.

These views I share, and I am prepared to state the observations on which my opinions are founded; but here I have to treat only of the facilities afforded for the study of forest science in Britain.

All the ground attached to some of the Schools of Forestry on the Continent which I have visited is less in extent than is the Arboretum in Edinburgh. In some, where the ground attached to the institution is of greater extent, the ground used for class exercises is not; and I have been informed in regard to others which I have not visited, that no ground for class exercises appears to be attached.

Should the proposal of Mr. Mackenzie in regard to a School of Forestry being instituted in connection with Epping Forest be entertained, I consider that many of the advantages of some of the Schools of Forestry on the Continent might be enjoyed by students attending, under the direction of a teacher of Forestry, classes, in connection with arrangements for the study of science by working men in London, and receiving instruction by him on subjects pertaining to forest science during the winter session, making, when necessary, excursions with him to Epping Forest, and spending the summers of successive years in forest work, under forest officers, in Epping Forest, New Forest, and Windsor, if any arrangement for their doing so can be made.

On the Continent distance is not reckoned of much moment in such matters.

Students at the School of Evois, in Finland, have their practical training under professors in Crown Forests remote from the institution. Those at the *Laesnoi Corps*, St. Petersburg, train theirs in forests connected with the second class, or inferior Forest School, at Lessino, far from the capital. Railway communication having facilitated travelling at little expense, in some of the Schools of

Forestry in Central and Western Europe the autumn excursions are, by arrangement, made in adjacent foreign countries, and this, when practicable, is preferred.

And, should arrangements such as I have suggested for the constitution of a class for the study of Forest Science in connection with either the University, or, which I think preferable, in connection with the Watt Institution, or, for that matter, in connection with the Andersonian University of Glasgow, or the projected College in Dundee, or the School of Arts or University of Aberdeen, like advantages might be secured to students in Scotland—spending the summer in forest work and excursion work in Epping Forest, New Forest, and Windsor, either along with students in the South or alternating in different seasons with them, and so securing continuous student labour for the management of these forests.

I consider that, if the studies were suitable, such arrangements might suffice for the training of foresters for the colonies; on which point alone I am qualified to speak from personal knowledge of colonial forests, and of what is required for their conservation, extension, and proper replantation. I infer that they would suffice for the training of young foresters looking forward to engagements in Britain after obtaining diplomas like unto those which the Highland and Agricultural Society of Scotland is authorized to grant after suitable examination; and from what I have heard of some forest officials in India who must have passed through the curriculum of study prescribed by the Indian Department of Government, they might suffice to form foresters not inferior in professional education, instruction, and training to these.

Should it be deemed desirable, as I think it is, that provision be made for still higher or more varied training being given to a select number of the more promising students, the desideratum can be met. In more than one of the most celebrated Schools of Forestry on the Continent, provision is made for the attendance of foreigners, and these enjoy all the educational advantages of the alumni on specified terms; and assuming that the teacher of botany—if there be but one—or one of them, if there be more, be qualified by knowledge of the language spoken, such advanced students might be sent under his direction to attend at one of these continental forest schools a summer session, and possibly permission might be obtained from the same or some other School of Forestry for the British Students to accompany the students of the country on their autumnal excursion, and to take part with them in the forest work, to the great advantage of teacher and taught, and through them of the country at large.

But it may be asked, what prospect is there at present of any further steps being taken to secure the organization of a British

School of Forestry? And here these facts meet us:—1. The Scottish Arboricultural Society has in successive years appointed a committee to give attention to this matter, and though the existing committee charged with this matter have not had any opportunity of imparting to their constituents what they have done, an impression exists that they have taken steps in advance of any which have previously been taken, and thus there is opened a door of hope in the North.

As has been intimated, definite proposals have been brought before the Epping Forest Committee of the Court of Common Council, in London, relative to the organization of a School of Forestry in connection with Epping Forest, which proposal has been favourably noticed by the public press. Nothing is known of the reception which this proposal has met with from the Committee, or which it is likely to meet with from the Court of Common Council, but the steps taken, and the approval expressed by the community, seem to open up also a door of hope in the South.

Assuming, then, that the difficulty of getting a forest for the training of students in the practical application of instruction imparted to them in school may probably be got over in a way satisfactory to most taking an intelligent interest in the matter, the question of curriculum may next come to the front. I have re-perused the programme of study I submitted for consideration four years ago, and which appears in the *Journal of Forestry*, vol. ii., pp. 39—41, and I see nothing in it to which I would now take exception; nor do I consider that it could be greatly altered with due regard to what is stated in the context. But looking to what might be done in other circumstances, and in ignorance of what these other circumstances may be, a simple statement might be made, and that statement prove equally practical in such circumstances as were then in view. The studies on forest science followed in Schools of Forestry on the Continent are classified as fundamental, professional, accessory; but as some classified under different heads are carried on contemporaneously, I can better convey my meaning by speaking of preparatory studies, and professional studies, and necessary studies, and classifying under these several heads what attainments are really pre-requisite to entrance on the school course, what studies the school course should embrace, and studies which, though not provided for in the school, it would be advantageous to the student to pursue in all, and in part, before or after, or during the course of school study, as circumstances may permit and favour.

Amongst pre-requisites absolutely necessary, I reckon robust health and a knowledge of reading, writing, and arithmetic; amongst others very necessary, but not absolutely indispensable, I reckon English composition, advanced rules of arithmetic, such as fractions, vulgar and decimal, and geometry; amongst others very desirable, mensuration, algebra, trigonometry; amongst others desirable and likely to be required in the class long before the course of study is completed, land-surveying, freehand drawing, and the elements of physical science. In the *Journal of Forestry*, vol. ii., p. 77, may be found a statement of what is required of candidates for acceptance as students preparatory to engaging in the Forest Service of India, but that statement and the above have been drawn up with very different objects in view.

Professional studies for which provision may be made, and for which *alone* it may be expedient to make provision in the school, may be arranged under the following heads:—

Part 1:—

Forest Botany, embracing the structure, physiology, scientific classification, and natural history of herbs found in woods, and arborescent shrubs and trees.

Forest Pathology, or diseases, natural decay, and death of trees.

Forest Mycology, or natural history of fungi found in forests, and of fungi injurious to trees and timber.

Forest Entomology, or natural history of insects injurious to forest products.

Forest Ornithology, treating of birds injurious or beneficial to the forests.

Forest Mazology, treating of quadrupeds, &c., injurious to forests.

Part 2:—

Destruction of Forests by Man.

Forest Conservation in France and in Germany.

History of Forestry.

Advanced Modern Forest Economy.

Sylviculture in accordance with the Advanced Modern Forest Economy.

Forestry of different Countries on the Continent of Europe.

Forestry and Arboriculture of Britain.

Improved Forestry in India.

Treatment of Forests in British Colonies.

Destruction, Conservation, and Extension of Forests in the United States of America.

# On the Tapping of Birch Nurses as a Means of Regulating their Exuberant Growth.

THAT birch-trees may be pierced in March and April, and a copious flow of sap obtained, for the purpose of making a delicate and pleasant beverage, is known in all northern countries, though the practice is now seldom resorted to in our British woodlands.

That, however, it may sometimes be adopted in arboriculture, for the purpose of rendering the birch a more manageable nurse-tree than it commonly is, will be seen from the following hints.

A nursing species used to shelter young oaks, and to hasten their upward growth, ceases to be a protection and becomes a more or less tyrannical neighbour, when it runs up aloft so fast as to be two or three times as high as the oaks, and to reduce them to the likeness of underwood, by comparison.

In many parts of the south of England such birches may be cut once near the ground, with axe or saw, early in May, as soon as the leaf is developed, when they will no longer bleed, and they will spring again from the stool. But in the North such after-growth is very seldom to be expected, and a large blank ensues, unless there be seedling ashes, or the like, ready to occupy the space, on air and light being admitted.

Hence it is that the birch, though a delightful nurse for a few years, soon becomes an engrossing step-mother. The question is, how can we keep her in check, without absolutely knocking her down? which it is often heart-breaking to do. The answer is, bleed her a little, by way of experiment, in March, and if she is not seen to be growing with less luxuriance in July, why then let the operation be repeated with more boldness in the following month of March.

You will soon learn what degree of tapping is requisite in order to bring the most overpowering of the step-mothers to a stand-still for a summer or two, until the oaks have advanced sufficiently towards the air and light. So far am I from deeming such treatment an indignity towards the beautiful birch, that I hold it to be a necessary discipline, which we must have recourse to, if the character of this favourite tree is to be vindicated as a nurse for oak. Only the tallest and most encroaching birches, however, should be tapped, and never those which are of moderate or inferior stature.

For the receipts for making Birch-wine, the reader is referred to Miller, Loudon, Selby, and others.

A birch will regain its vigour after the rest of a year or two from depletion.

RALPH CARR ELLISON.

# The Glencorse Estate Case.

A CASE of great interest to the owners of woods and plantations was tried before Lord Rutherford Clark, in the Outer House of the Court of Sessions, Edinburgh, on the 22nd of February, and following days, in which the Right Hon. John Inglis, of Glencorse, in the county of Midlothian, sought to obtain interdict against the Shotts Iron Company from calcining ironstone within two miles of the pursuer's estate of Glencorse. The calcining of ironstone had been carried on during the winter months for some years by the defenders, on land adjacent to the Glencorse Estate, and the pursuer alleged that the fumes proceeding from the burning ironstone had done serious injury to the trees on his estate. During the seven days over which the trial extended, a large number of experts were examined on both sides, the pursuer's witnesses distinctly affirming that the condition of the said plantations was wholly owing to the sulphureous fumes proceeding from the calcining of ironstone by the defenders. On the other hand, the witnesses examined for the defence as distinctly affirmed that the proximity of the calcining operations was not the cause of the unhealthy state of the plantations, and ascribed their condition to mismanagement and natural causes; in proof of which, evidence was given that other plantations in several parts of the country, far distant from any calcining operations, are suffering in a similar manner from exactly the same causes. The chief of these causes appear to be,—the bad influences of the weather in the years 1876 and 1877 on vegetation, particularly on certain species of trees; exposure to bleak winds, unsuitable soil, bad drainage, and neglect of timely thinning and proper management for the healthy development of the trees.

So far as we are able to trace the details of the evidence, from the meagre reports of the trial given in the Scotch papers, we are not yet in possession of sufficient data to be able to review in full the important points in dispute, nor the evidence given at great length by the parties in the case, and we reserve our comments until the complete details of the case are before us. In the meantime we extract from the *Edinburgh Courant* the decision given by Lord Rutherford Clark, and his remarks upon the case; which is a happy conclusion for the owners of trees and plantations, although it may be a most disastrous one for the mining industry of the country. The decision and remarks, as given in the *Edinburgh Courant* of March 21, are as follows:—

"Lord Rutherford Clark has to-day issued an interdict in the action at the instance of Lord President Inglis of Glencorse against the Shotts Iron Company, in which the pursuer sought to have the defenders interdicted from carrying on the process of calcining ironstone in the neighbourhood of his plantations, averring that the fumes from the calcining bings were destroying his plantations.

"The Lord Ordinary finds, declares, and decerns in terms of the declaratory conclusions of the summons; further interdicts and prohibits defenders in all time coming from calcining ironstone or iron ore or burning blaze on any parts of the lands of Penicuik within one mile of pursuer's lands, and decerns: finds the pursuer entitled to expenses.

"In a note his Lordship says:—

"This case has been conducted on both sides with great anxiety and ability. When the Lord Ordinary came to hear the parties on the evidence it was admitted that there was no question of law between them. The Lord Ordinary has only to decide the question of fact. It is this—namely, whether the pursuer's estate has been injured by the calcining operations carried on by the defenders. The pursuer conceded that he must establish a substantial injury. The defenders admitted that if he did so he was in law entitled to the remedy which he sought. The evidence which has been led is very voluminous and very conflicting. The Lord Ordinary does not propose to examine it in detail. The defenders began to calcine in March 1877, and they have since continued to do so. The pursuer complains chiefly of injury to the lands of Glencorse, although he alleges that Bellwood has also suffered. The case for the pursuer is that prior to 1877 the trees on his estate were remarkably thriving; that the first appearance of injury to the plantations was in the summer of 1877, immediately after the calcining in the end of that year; that the injury has increased, and is increasing very rapidly, and that it is wholly due to the calcining. A large number of witnesses of skill support this view, and say that the injury from calcining is of the most marked and obvious kind. As the Lord Ordinary understood them, the defenders did not dispute that the plantations went back in 1877, but attributed that to the cold and wet seasons of 1876-77. With respect to the coniferæ which were most injured, it was said that their condition was due to overcrowding, want of drainage, bad soil, and bad climate, and planting under deciduous trees, especially beeches; but they allege that while such decay as exists is due to these causes, the plantations within the last few years have improved on the whole. They bring a great body of witnesses in support of their averments. These witnesses depone that there is not the slightest trace of injury from calcining. In this state of the evidence it is necessary to examine the reasons why calcining of ironstone may be injurious to vegetation. When the raw ore is calcined it contains about one per cent. of combustible sulphur. This substance, when burned in open air, gives off sulphureous acid, which gradually becomes sulphuric acid by the absorption of another atom of oxygen. It is not disputed that sulphureous acid and sulphuric acid, when present in sufficient quantity, are injurious to vegetable life. The question is whether these acids, or either of them, reached the pursuer's land in such quantities as to injure vegetation. That the smoke from the bings comes upon the pursuer's land is not capable of dispute. That has been matter of careful observation. Plans based on these observations have been made by Mr. Blyth, showing the number of times the smoke has come from the bings, and the distances it has reached. A reference to these plans will show that the pursuer's plantations had been very frequently subjected to the influence of the smoke, and particularly at those places where injury has been observed. It is proved that the smoke, if the weather is calm, hangs about the places which it has reached, and takes considerable time to dissipate. But does the smoke contain or carry with it the acids in destructive or injurious quantity? The later experiments and observations of Professor Dewar and Dr. Dittmar seem to the Lord Ordinary to prove that the sulphureous fumes reached the pursuer's lands in a quantity sufficient to injure. But they do more. They seem to remove any doubt which attaches to the rain-test, and to show that the notable increase of sulphates in the rain-test was due to the increase of free acid and not to the sulphate of ammonia. Hence, in the opinion of the Lord Ordinary, it is proved that the calcining operations of the defenders were capable of injuring the pursuer's lands, and he is therefore disposed to accept the evidence of those who say that they do injure them rather than the evidence of those who say that they do not. The Lord Ordinary may say that he places much reliance on the evidence of Dr. Angus Smith, whose experience and position show him to be a very competent observer, and whose testimony is very decided in favour of the pursuer. The defenders have no doubt some strong points in their favour. They have given evidence to show, first, the calcination of ironstone containing more combustible sulphur than that which is calcined by the defenders is not injurious to vegetation; and, second, that when ore containing much more sulphur is calcined, the injury does not extend beyond 300 or 400 yards at the most. But these are isolated instances which have not been examined on their own merits, and, though very important, cannot, it is thought, outweigh the evidence which the pursuer has brought in this case. But they further found on the fact that the trees and hedges nearest to the bings have not suffered. It is certainly natural to suppose that the nearest trees and hedges would suffer first, and it is singular that it is not so in the present case; but this may be explained on the ground that the fumes have been carried past them or over them. It is impossible to speculate with any certainty on the height to which fumes would rise and the place to which they would be carried with destructive effect, or on the reasons why some trees may resist while others fall. The circumstance founded on by the defenders is no doubt much in their favour, but it cannot overcome what the Lord Ordinary holds to be the positive evidence of the presence of injurious fumes in the pursuer's estate, and the injury resulting therefrom. It remains to consider how far the prohibition by the Court against calcining is to extend. This must necessarily be fixed in some arbitrary manner; but if the view which the Lord Ordinary has taken of the evidence be correct, he thinks that it would not be safe to put the limit at less than one mile."

We are informed that the above decision is to be immediately appealed against to the Inner House of the Court of Sessions, and may possibly end in an appeal to the House of Lords; therefore further comment would be unseemly until the case is finally settled.

OBITUARY.—We regret to notice the death of Mr. JAMES ALEXANDER, sen., of Redbraes, Edinburgh, who was till lately senior partner in the well-known nursery firm of Dicksons & Co., Waterloo Place, Edinburgh. Mr. ALEXANDER was one of the orginal members of the Scottish Arboricultural Society, and was elected its first secretary, which office he held for several years. Few men were so well known or so highly esteemed among foresters; and his kindhearted sagacious counsel has proved invaluable to young men. His loss will be deeply felt by his numerous friends throughout the country.

## EFFECTS OF THE WINTER STORMS.

SIR, — The heavy snow-storms of the winter of 1880—81, which culminated in the extraordinary storm of the 3rd, 4th, and 5th of March, have done serious damage in many places, both from the extremely low temperature, and the great depth of snow which has fallen. The whole fall in this quarter, as registered at Murthly Castle, Perthshire, up to this date, is 5½ ft.; the lowest temperature, 4 ft. above the ground was 28 degrees of frost, at an altiude of 85 feet above the Tay.

The great weight of snow has broken many fine specimens of pines, in spite of the attention bestowed upon them, in having the snow, when heavy, shaken off their branches. Large limbs and branches are torn out of their sockets, and many fine specimens permanently disfigured, especially of *Cedrus libanus*, and *Cedrus deodara*, and the wide-spreading *Abies Douglasii*, oak, elm and beech have suffered alike.

I have seen for the first time, the *Araucaria imbricata* frosted down like a geranium. This, of course, is not due to the intensity of frost alone, but to the effects of *hoar* frosts, or "rime" as it is locally termed. The *Wellingtonia gigantea* has suffered very much from these frosts, and many have succumbed altogether in close damp situations. Many of the newly planted trees seem to be quite frost-bitten.

Last but not least, are the bad effects of the very sudden thaw which set in on Tuesday, the 8th, when the roads and drives everywhere could well be compared to burns or small rivers, and the fields in the policies to an extensive lake studded with islands and trees. The approaches, and some of the fields, are very deeply cut up by the rushing torrents.

D. F. MACKENZIE.

*Murtly Castle, Perthshire.*

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SIR,—I have been interested in reading the various reports regarding the recent snow-storms in different localities of England, and it is with deep regret that I have to record a similar disastrous state of things in Scotland, more especially in this district, viz. Perthshire.

Last summer being exceedingly favourable to our woods and plantations, the season's growths were early and vigorous, especially the larch, the annual growths attaining, in many young plantations, a length of from 18 to 36 inches, that of the Scotch pines averaging from 6 to 10 inches, the season being more favourable for the former; the consequence was that those classes of trees were quite matured against a severe winter such as the present.

In the case of rhododendrons, bays, laurels, aucubas, and other shrubs, the winter has had a most detrimental effect, most of the last year's shoots being quite destroyed, as well as the flower buds, so that the bushes have assumed a ruined aspect, and in many cases the plants are quite killed.

As regards our ornamental and Park-trees, the damage done is serious, many that were once beautiful being broken and disfigured by the great weight of snow resting on the branches, added to the fury of the gale. But the trees which have suffered most are those which were unproportionately balanced, through being one-sided or cleft-headed, and these were split up the centre. Many young pine plantations (*Pinus sylvestris*) have been severely damaged by the snow which has weighed the branches down and torn them from their sockets in some instances, whilst in others the rabbits have been enabled to get at them, and in this way many fine trees are severely nibbled.

Owing to the long continuance of snow on the ground, the rabbits have been prevented from getting at anything except trees and hedges, the consequence is, many a tree has been peeled and stripped of its bark, not only young ones, but good sized standard ash, elm, sycamore, &c. Our hedges have suffered severely, and inasmuch as each successive fall or drift of snow enabled the rabbits to reach higher up; many are peeled to the top, the uppermost branches and buds being entirely eaten, and permanent injury caused by these destructive rodents. Our roads in the district have been nearly all blocked up, the drift being level between the fences, and traffic could not be resumed until the snow was removed by manual labour.

DENUNTIO.

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## EFFECTS OF THE STORM.

SIR,—I enclose a list of killed and wounded as far as we can see. *Viburnum plicatum*, which seemed to me to be the same as *V. awafurki*, mentioned in the *Gardeners' Chronicle*, p. 625, Nov. 1878, has been killed at the ends of the shoots in the two past winters, but shot vigorously each following summer. Now I fear it is killed outright.

Many of the laurels and bays are browned here, and even some aucubas. Common laurestinus are more severely injured than I ever knew them, and they smelt as if they had been scorched for some time after the severe frost. We are distant here about four miles from Falmouth, and one mile from the sea. The following have been killed outright:—

*Veronica salicifolia*, and others.
*Eugenia ugni*, in the valley.
*Fuchsias*, to the ground.
*Clianthus*, nearly killed on south wall. Young shoots killed.
*Elæagnus japonica*.

The following have been more or less injured:—

*Benthamia fragifera*.

*Myoporum undulatum*, in valley.
*Olea illicifolia.*
*Sciadopitys verticillata.*
*Ligustrum coriaceum.*
*Aralia Sieboldii.*
Australian myrtle.
*Garrya elliptica.*
*Euonymus.*
*Aristotelia Macquii.*

The following are uninjured both in valley and on hill.

*Grislinia littoralis.*
*Pittosporum Mayii.*

At Hartley, near Plymouth, 300 feet above the sea, the list of killed includes:—

*Abutilon vitifolium.*
*Viburnum plicatum.*
Many *Euonymus.*
All *veronicas*, except cuttings.
*Escallonia Montevidensis.*
*Fuchsias.*

*Hartley, Plymouth*, March 22, 1881. H. ROGERS.

## WOODS AND THEIR MANAGEMENT.

SIR,—If it is to be presumed that we are to accept Mr. William Harrower as the mouthpiece of Irish foresters, I am afraid that the system of thinning which they adopt cannot be considered a judicious one. From the concluding sentence of that gentleman's letter, in the February number of the *Journal of Forestry*, it would seem that he (rather presumptuously, I should think) takes upon himself the honour of representing the whole of the foresters in Ireland. In speaking of my ideas of thinning, he there says, "*We*, in Ireland at least, must adopt his suggestions and accept his ideas regarding the thinning of young plantations for what they are worth."

Now, although I do not say that Mr. Harrower is not to be considered qualified to act in this light, still I maintain that he is going too far when he intimates that all Irish foresters are of the same opinion as himself. I have the privilege of being acquainted with a good many of them, and I know for certain that they would not all agree with Mr. H. when he infers that a plantation should not be thinned till it is fifteen years of age. But I need not speak for them more than him, but merely speak for myself. Of course it all depends upon circumstances, but your correspondent should know as well as any one else what the state of a plantation, making a fair growth, would be when it reached the age mentioned. I think that we may safely say that a mixed plantation of conifers will have reached on an average the height of 20 feet at fifteen years. Now if they had been planted at say 3½ feet apart over all at first, and had reached the height of 20 feet without being thinned, what kind of plantation would it be?

The height of the trees would be nearly six times the distance between them, and I am afraid that if there were any hard woods among them they would have but a poor chance of coming to be profitable timber.

Mr. Harrower will in all probability be aware that the growth of vegetation in Ireland is far ranker than it is either in England or Scotland. I know from experience that young plantations in the former generally require to be thinned earlier than they do in the latter countries. A well-known land agent in the South of Ireland, himself an Irishman and well-acquainted with practical forestry, lately told me that in his opinion Scotch foresters when they come over to Ireland do not thin nearly as much as they ought to. I am quite of this opinion myself, and especially since I have been in the South of Ireland I have noticed that where there are considerable extents of woods they are in general allowed to grow up till they are mere poles. This may be all very well for certain purposes, but I maintain that it will not be found to be the most profitable system in the end.

In England I have seen larch, cut down at the age of sixteen years, of such a size that it gave two strong men quite enough to do to carry one of them out of the plantation at a time, and their growth was not considered as anything extraordinary. They were properly thinned in time, and allowed to have enough room to develop themselves without at the same time being left too thin.

Of course when I speak of thinning, in the way in which I have done during this correspondence, I mean thinning as applied to plantations in a healthy condition. When "Sea Green" asked for advice regarding his plantation of 300 acres, he said that "the trees are from fifteen to thirty years old and *very* thriving." My observations, therefore, were only meant to apply so far as thriving plantations were concerned, so that Mr. Harrower need not be surprised that I did not say anything regarding heart-rot or any of the other subjects he mentions. Thinning must in all cases be conducted according to the circumstances of each case, and until these circumstances are seen on the spot it is of very little avail writing on the subject.

If your correspondent finds fault with my ideas of thinning, why does he not give us his own in comparison? I fail to see the use of a correspondent objecting to what another brings forward, while he does not advance his own views of the subject for discussion. We have all been invited, long since, to give our views on any subject in this *Journal*, so that opinions may be discussed for the mutual benefit of all concerned. If Mr. Harrower comes forward in a fair way and gives us his advice, then I may very probably have something more to say on the subject.

I quite agree with W. W. when he says that thinning cannot be thoroughly understood from theory; although a volume were to be written on the subject, it would not be of as much service to a young forester as a few months in the woods themselves. W. W. was certainly right in condemning the system of pruning trees up to within 4 ft. of the top. I have also seen this ruinous plan adopted in a few instances, and have no hesitation in saying that it is a bad one. The severe pruning of any kind of tree in this manner is against all the rules of forestry, and especially so in the case of coniferous trees, which ought seldom to be touched by the pruning knife.

I am quite prepared to give "facts and figures" in proof of my method of thinning, on condition that Mr. William Harrower consents to favour us with proofs of the system which he seems to be in favour of. Perhaps such a discussion will lead us to inquire whether or not the thinning of woods and plantations ought to be left in the hands of a "mere novice."

GEORGE E. BROWN.

## THE TIMBER LINE OF HIGH MOUNTAINS.

SIR,—The above heading, in this month's *Journal*, at p. 751, in reference to North Carolina and Mount Washington, &c., has brought an old idea to my recollection, of which I had often thought before, viz. the difference in the timber line of our Highland hills now, compared with what it must have been at one time, when they were clad with trees and bushes, where at present they are bare and barren in regard to both. In proof of this vast change, if proof were wanted, I have seen large trees of black oak dug out of the moss, and peats made for fuel, that were wholly composed of decayed vegetable matter, the refuse of trees and bushes, in which the hazel or filbert nuts were abundant, clearly indicating that the place and neighbourhood must have been teeming with forest produce at one time, where neither tree nor bush is now to be seen within miles of the place; and it is not so much the want of soil as the want of climate that must have caused the change, for there are many acres of flat ground, composed partly of moss and partly of light moorish soil, all tending to prove that a great and gradual change has and is taking place in regard to our climate, especially for the growth of timber trees.

J. McLAREN.

*Hopetoun, March* 15, 1881.

## SEVERE BLIGHT OF THE EUONYMUS.

SIR,—In my garden I happen to have some trees. I am, consequently, interested in arboriculture, and having accidentally met with a number of your *Journal*, more than a year ago, I have taken it ever since. I was rather daunted at first by the learned names which are so familiarly used by your contributors, in talking of trees, and I began to fancy it was too late in the day for me to fall back on my Greek and Latin, in order to qualify myself to describe a plant or ask a question about one, in your columns. But I have persevered so far, through all difficulties, and it is a great comfort to me to be able to tell my visitors, that the fine old ash tree that throws its shadow across my window, where I write, is a species of *Fraxinus*. One party observed that, in his opinion, it was nothing but a common ash tree. I explained to him that in the vulgar tongue it was so, but it was known to science all over Europe as the *Fraxinus*. This shut him up completely, and the rest of the company evidently regarded him afterwards with suppressed compassion.

My greatest stumbling-block in studying the nomenclature of plants was, the Latinising of family patronymics and affixing them to the different species of trees, shrubs, and flowers, as you would a qualifying adjective, such as brown, white, or red. We have *Wellingtonia*, *Douglasii*, *Albertiana*, *Jeffreii*, *Jackmanni*, and even *Smithiana*, which conveyed to my mind no definite idea of the properties of the plants they were attached to; nor would old "Ainsworth," on that point, give me the smallest assistance; so that when I came to *Abies Hookeriana*, it would be hardly surprising if I felt inclined to hook it altogether. However, I hope I am wiser now, and I can read the *Journal* intelligently, without having perpetual recourse to my Latin dictionary to help me along.

But, Sir, my object, in writing to you was not to talk about myself and my lately acquired tree knowledge, by the teaching of your instructive *Journal*. I wished to call the attention of your readers to one remarkable effect of the excessive cold and the cutting blasts by which the evergreens in the neighbourhood of London were *scarified* in the month of January. The previous two winters had been so injurious to the Laurel tribe that many of them on the return of spring seemed to be past pruning. Damaged the first winter, the second nearly destroyed them. Some fine bushes of the common laurel, that were bright and healthy three years ago, were so severely crippled last year that whole branches seemed to have lost all vitality. I headed them back till I found some sign of sap, and a feeble bud would perhaps show itself, only to die off again before it was an inch long. The whole of last summer these, having dwindled to half the size they had been, showed no signs of returning vigour, and had entirely lost all claim to be considered ornamental; entire woody branches having been cut away as dead and useless, and, strange to say, the sturdy old plants, with stems as thick as one's arm, suffered more than those smaller and younger, with less than half the substance of wood in them.

But in contrast to these were some bushes of the *Euonymus*, or spike laurel, which grew and flourished through both winters, being absolutely larger bushes when winter took its departure than they had been when it began. The absence of hard frost, for two or three days in succession, found them growing afresh, and they sustained no perceptible injury. I have no liking for this shrub, except for its hardihood. It does very well to fill a corner. It is a fast grower, and may be taken up and transplanted almost at any time. But it has no pretension to compare with the bay, the *laurustinas*, or the elegant Portugal laurel. It's foliage is of a cold dark green, and it is almost as stiff and formal in growth as Butcher's broom. Strange to say, however, none of the laurels seem to have suffered so much in the south of England this winter as this hardy *Euonymus*. Its dark green leaves have turned almost white, and all last year's shoots, some of them three feet long, have gone literally to straw. Probably by the time this is in print the eyesore they present in the suburbs of London may have disappeared, through the wind stripping off the dead leaves, or by the knife of the pruner, but at the present writing, wherever you get a glimpse of a garden, the *Euonymus*, blighted and greyheaded—if such a plant be there—stands out conspicuously, a pitiable object, as if calling your attention to the dreadful treatment it had received. Laurels, too, are greatly cut up, but not nearly so much as the *Euonymus*. Can science explain this departure from the ordinary course of nature? I have had laurels of twenty years old so much damaged by a severe winter that they were nothing more than deformed and wretched stumps afterwards, while the *Euonymi* were not appreciably injured. Yet in the fierce blasts and bitter cold of last winter no evergreen seems to have suffered more.

Some one not long ago said in your columns, that the inquiries of the ignorant were quite as useful as the answers of the proficient, or words to that effect. Between both, truth is elucidated. You will not then refuse, perhaps, even this small contribution from.

TURNHAM GREEN.

*March* 11, 1881.

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## THE SCOTTISH ARBORICULTURAL SOCIETY.

SIR,—In reply to Mr. Sym Scott, I have to state that when writing the article he refers to at page 729 of the March number, I cannot say that I had him, nor any other person in particular in my mind's eye at the time I was writing. He, however, thinks the coat fits, and has put it on, and with your kind permission I shall try to answer some of the questions he asks.

Mr. S. Scott says, "If Mr. McKenzie believes the sap is thrown back on the bole," &c. My reply to that is, that I did not say so, and that the article he complains of had no reference *to my own opinions* on the disease of the larch at all, and if he would take the trouble to read, he would find my statements are qualified further on, and in no way have I committed myself to any other person's opinions. The reason for such a course is obvious. Having written on that subject several years ago, so far as is known to me, my theories have not been proved to be wrong. Mr. Scott asks: "How many of your readers believe this?" (*i.e.* sap thrown back on the bole, &c). I hope those who do, and those who do not believe, will answer the question; I cannot. The onus of proof, that aphides are *not* the cause of the *ulcerations*, does not lie on me, but on Mr. Scott, and I challenge him to prove that the aphides are not the cause of the ulceration; that is, to prove to your readers that the aphides have nothing to do with the "structural" disease of bark and inner skin of the larch plants and trees. If Mr. Scott can prove they have not, then there is so much gained, and it may enable your readers to form some opinion as to whether or not Mr. Scott is more enlightened than those who took part in the late debate on the larch disease.

With regard to criticism, I meant that no person should criticise who cannot show the writer or operator to be wrong. It shows a great lack of intelligence on the part of the critic to do so, and points directly to the fact that the said critic can not overturn the theory he criticises by any theory *he* can advance. He should therefore let it alone, or ask the writer, or author of the theory, to explain. I hope that these critics, including Mr. Scott, will lose no time in showing your readers that I am wrong in my opinion of their talent, so far as the disease of the larch controversy is concerned.

It would appear very odd to most sensible people to see a work criticised and the critic not stating the points wrong. There is no reason why the doings and sayings of any society, or other bodies, or works, should not be looked into and criticised thoroughly, but that should be done by competent persons, who are themselves able to deal with the work *practically*, not theoretically; there is therefore no reason for showing "the utmost forbearance on the part of any writer," when he can handle the subject practically.

I am not aware of saying, far less writing, that the *Journal of Forestry* was *not* the proper place to discuss all matters connected with forestry both at home and abroad; if I did so, I must have expressed what was quite contrary to my opinion and actions, because I take every opportunity of laying the usefulness of such an organ before all those in any way connected with woods, with fruitful results, too.

*Murtly Castle, Perthshire.* D. F. MACKENZIE.

## ISOLATED TREES IN PARKS AND ON LAWNS.

SIR,—From the article on this subject in your March number, by Mr. D. T. Fish, we are given to understand that it is not good for trees to be planted in this manner. The very first words of that article are: "these are seldom healthy or effective." As far as my experience in the matter goes I have generally found that if trees are planted by themselves, upon suitable sites, together with a congenial soil, they will not fail to succeed, unless, indeed, anything unforseen occurs. Let any one take a journey through the country, visiting a few of the principal seats of our large landed proprietors as he goes along, and I am far mistaken if he does not find many a sound healthy growing tree situated by itself, upon a lawn or in a pinetum. Again, your correspondent says that these trees are seldom effective. In this opinion I do not think that he will find himself supported by very many authorities, neither does he give the majority of landed proprietors or their representatives much credit for good taste in this matter.

Any one wishing to plant a few single specimens upon a lawn or pleasure-ground, would be committing a very unwise action if he selected them from amongst the trees of a "well-sheltered wood or plantation." Any man, with the least idea of the subject might know that such a situation would be the worst possible one from which to select his plants. When specimen trees are wanted for such a position they should always be selected from some rather exposed place, or, what is far preferable, they should be taken from a nursery where they have been grown with plenty of room, for the express purpose of being planted out as single specimens. On any estate where there is much of this kind of work to be done, a home nursery should be kept, however small, for the purpose of rearing specimen plants of whatever kinds may be wanted. These should be reared in such a manner that when they are transplanted to their permanent sites, they may not receive too sudden a check from exposure. In short, in the nursery they ought to be frequently transplanted, and gradually placed at wider distances apart, until before being transplanted permanently they are of such a size, and have been grown at such a distance, as to render their after success almost a certainty, under careful transplanting, and subsequent good management.

Young trees growing in a plantation are not usually the kinds that are wanted for a lawn or a park ; and besides, they have seldom such a supply of good fibrous roots as will ensure their success after being transplanted. Trees for this purpose are generally wanted of a more ornamental and rarer character than are those usually planted in our woods.

Your correspondent seems to have his own opinion about a pinetum, which is certainly not a favourable one. In the opinion of the writer a well-arranged and judiciously laid out pinetum is one of the pleasantest spots in the world to wander in. I have wandered through a few of them and have always seen that where the soil and situation are suitable, the trees are almost certain to be healthy, and in such cases they cannot fail to please the eye of the beholder. Besides, the trees in a pinetum or arboretum are generally those that are considered "rare" in this country, unless a few others are intermixed between them, to act as nurses until the rarer specimens get fully established in their sites.

I quite agree with Mr. Fish in what he says regarding the grouping of trees in a park being a natural and pleasing method, but I maintain that he, in his enthusiastic admiration of that system, forgets that the plan of planting ornamental trees as single specimens is not only one of well-worn usage, but, if carried out, under careful management, tends to produce specimens not only healthy, but effective. GEORGE E. BROWN.

## PINES AT HOPETOUN.

SIR,—Among the numerous pines upon this property is the Siberian Stone Pine, one of which girths 9¼ ft., 5 ft. above the ground, has a clean bole of 20 ft., and is altogether 45 ft. high, and is growing upon clay.

There are also some good specimens of the Weymouth Pine, containing upwards of 60 cubic feet, are from 60 to 70 years old, and still thriving, although the opinion of some people is that they are short-lived.

*Hopetoun, March*, 1881. JOHN MCLAREN.

## FERNS ON THE WELSH MOUNTAINS.

SIR,—As many foresters have the advantage, if so interested, in their daily walks through wood and dale of picking up different kinds of rare plants, the following list of ferns collected by me in this immediate neighbourhood may be interesting to those of your readers who combine the pleasure of botany, or more correctly speaking horticulture, with that of arboriculture:—

| | |
|---|---|
| *Allosorus crispus* | Mountain parsley fern |
| *Asplenium adiantum-nigrum* | Black maiden hair spleenwort |
| ,, *marinum* | Sea spleenwort |
| ,, *ruta-muraria* | Rue-leaved spleenwort |
| ,, *trichomanes* | Black-stemmed spleenwort |
| ,, *viride* | Green-stemmed spleenwort |
| *Athyrium felix-fœmina* | Lady fern |
| ,, red stemmed *var.* | |
| *Blechnum spicant* | The hard fern |
| ,, new variety | |
| *Ceterach officinarum* | The scaly spleenwort |
| *Cystopteris fragilis* | The bladder fern |
| ,, *dentata* | |
| *Hymenophyllum Tunbridgense* | The Tunbridge filmy fern |
| ,, *Wilsonii* | Wilson's filmy fern |
| *Lastrea æmula* | The hayscented buckler fern |
| ,, *dilatata* | The broad buckler fern |
| ,, *felix-mas.* | The male fern |
| ,, *oreopteris* | The mountain Buckler fern |
| ,, *rigida* | The rigid buckler fern |
| ,, *spinulosa* | |
| *Ophioglossum vulgatum* | The adder's tongue fern |
| *Polypodium dryopteris* | The oak fern |
| ,, *phegopteris* | The beech fern |
| ,, *vulgare* | Common polypody |
| *Polystichum aculeatum* | The prickly shield fern |
| ,, *angulare* | |
| ,, ,, *angustatum* | The soft prickly shield fern |
| *Pteris aquilina* | The brake fern |
| *Scolopendrium vulgare* | The hart's tongue fern |

Several rarer ferns have also been found, such as the *Asplenium septentrionale*, *Woodsia ilvensis*, and the Welsh Polopody, *Polypodium Cambricum.*

The mountains in this part of Carnarvonshire are rich in Alpine plants, the search for such being well repaid by the pleasure of a rare find.

ANGUS D. WEBSTER.

*Penrhyn, Bangor, North Wales,*
*March* 14, 1881.

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## THE INDIAN FOREST DEPARTMENT.

SIR,—A few letters lately appeared in the *Pioneer* of India which, if they did but very partially indicate the grievances that are now causing so much discontent in the Indian Forest Department, were, at any rate, sufficiently forcible in their condemnation of some of the more recent abuses. The cry then raised, it may be said, was but a small one, but the department is also a small one, and from a very small body of men we cannot expect the cry of a multitude, as in the case of the Civil Service and other strong corporations. It is probably because our cry must always be a small one that we have to put up with so much. In any case it was a genuine cry of distress on the part of a very deserving body of men, and as such it should be heard. Allow me, therefore, to repeat it once more, through the medium of your influential and widely read *Journal*. It is possible that with the lull consequent on the suspension of hostilities on the frontier, this feeble voice of ours may yet not pass unnoticed, and that Government may be induced to see the nature of our grievances, and the impolicy of allowing so much justifiable discontent to be created among an exceptionally hard-worked body of men, to whose individual efforts it is mainly dependent for an important item in its revenue. What we principally complain of in this branch of the public service is that the Government of India does not take any real interest either in the working of the department or in the welfare of the officers who constitute it. This is only too apparent from the circulars and orders which emanate from the Government of India, and which bear only too plainly the impress of having been originated at the hands of the Inspector-General himself, and of having been issued without sufficient reference being made by Government as to their general expediency. It is difficult under any other hypothesis to explain away the narrow-minded and one-sided policy that is now so rapidly undermining the previous general efficiency of the Forest Department. I cannot believe that a body of intelligent men well versed in the subject could bring themselves to approve of measures such as those of which I propose further on to speak. On the other hand, we can all of us readily understand that the complicated business of forest management, based a great deal as it is on the knowledge of a special science, presents so many difficulties to those who have to deal with its questions on the part of Government that there has arisen a tendency to leave a greater latitude in the disposal of such matters to the Inspector-General than could be at all desirable with a view to prevent serious abuses arising therefrom. In the first place, favouritism and private interests have been brought to bear on numerous occasions in the selection of officers for the higher posts in the department. It is now more than a year ago that Mr. Gamble, then an Assistant Conservator of the 2nd Grade on Rs. 350 per mensem, was suddenly elevated over the heads of more than half the number of his fellow-officers, to the Conservatorship of Bengal, and under the assumption that he was thus selected for reasons of merit only. It is a notion too ridiculous to entertain that, among the crowd over whom he passed there were not fully half a dozen men quite as competent as, if not more so than, the then comparatively inexperienced assistant, to undertake the charge of the Bengal Forest Administration. We uttered a protest at the time, which found its way into the *Pioneer*. This protest was silenced by an article which afterwards explained that the promotion of Mr. Gamble was purely a *temporary arrangement*, and would last only until Dr. Schlich's return from sick leave. Although most of us doubted this fact, from having had already sufficient experience of the peculiar interpretation liable to be placed on the words "temporary arrangement," and although the measure was unjust, even as a "temporary" one, we were yet content to trust in the assurances thus conveyed to us. However, results have only too well confirmed our previous distrust of the good intentions of the chief of our department. It is now a long time since Dr. Schlich has resumed his duties, but Mr. Gamble continues to act as Conservator of Bengal. At the time of his most extraordinary promotion he was serving as Personal Assistant to the Inspector-General, and we have very good and apparent reasons for seeing marks of favouritism in his selection. A duplicate illustration of the same kind of proceeding as that in which Mr. Gamble figures occurs in the recent appointment of Mr. Bagshawe to the Conservatorship of Berar. The introduction into the department of a number of German friends and fellow-countrymen of the Inspector-General is a still further instance of the personal influence of which I have been speaking. The circumstance is a peculiarly exasperating one from every point of view. It is apparent to us that, if promotion is to be based upon selection at all, the Inspector-General should not be allowed, as at present, to have an exclusive voice in the choice of fitting officers for the vacant posts, but that the Government of India should rather seek assistance and advice from the Local Governments. The latter would be familiar with the qualifications of their forest officers, and would, therefore, not be influenced to such a great extent as the Central Government in their selection of proper substitutes by the opinion of *one man only*. Next on the list of our wrongs comes the inefficiency of the department as regards the number of its officers. This is a very grievous point indeed, as I shall proceed to explain. Apart from the fact that most of us attribute a loss in revenue to the imperfect supervision that is natural with so small a staff, it is impossible, from the difficulty of procuring substitutes, for us to avail ourselves of those periods of leave that are opened out to us by the Civil Leave Code, and which to the Forest Officer, subject as he is to exceptionally unfavourable conditions of climate, may be said to be peculiarly necessary. This impossibility of getting the leave legitimately due to us will be evident to you when I inform you that the department is so disgracefully undermanned that Government has recently felt compelled to forbid furlough for a season to the entire staff. It is quite an unprecedented step, and a very deplorable one. Another result of our inefficiency in the above respect is that, if an officer should be so perverse as to get sick, some other officer has to do double duty, and that without any increase in his salary until some wretched recruit, hurriedly enlisted for the purpose, and more or less wholly incompetent, comes to relieve him of part of it. When it is borne in mind that the really valuable Forest Officer is the man who has passed much of his life in the forests, Government would, one might reasonably infer, do everything in its power to maintain the number and the efficiency of this class of men by allowing us, if anything, enhanced privileges as regards leave, instead of rendering us, as at present, worse off in this respect than any other department in India. The cause of all this lies, of course, in a strained effort after economy; but it is not difficult to see that this most unwise, and, as regards ourselves, most unjust policy, must result in sure and certain loss to Government. It is not economy, it is extravagance, and another evidence of that personal government in the case of this department that is so much to be deplored. In pursuance, we presume, of this same general object, the higher appointments in the service have been so diminished in number that to an officer who, after a dozen years of toil, has risen to the enjoyment of Rs. 500 per mensem, all further prospect is virtually closed. The Conservators are necessarily few, and their appointments will always be greedily fought for. Between the Deputy Conservatorship on Rs. 500 per mensem, and the Conservatorship itself, we have in the entire department only nine intervening posts. When I add that all the Conservatorships and all the intervening steps referred to are filled up with quite young men, most of them being actually under forty, you must agree with me that the prospects of half-way-up men are miserable in the extreme. Not content with making our future a perfect blank, but determined to let Government see how impolitic it would be on their part to remove so useful a servant merely because he happens to be close on sixty years of age, the great economist, who thus practically rules our destinies, next proceeds to curtail our travelling allowances to such an extent that, should Government finally adopt his suggestions, we shall in self-defence have to neglect some of our duties, or else pay for our expenses out of our private resources. It is only just to observe here that in all these reductions the Inspector-General has carefully excluded his own appointment and attendant allowances. The most discreditable part in these reductions is the manner in which the covenanted officers in the department are affected by them. It is not difficult to understand that the greater number of these gentlemen would never have agreed to enter the service at all had it been possible for them to foresee that the bait which then allured them would hereafter be withdrawn, but not before it would be too late for most of them to make other arrangements for a livelihood. For years past we have all been under the impression that Government would, if anything, improve our prospects. Underpaid and over-worked by contrast with all other departments, and under peculiarly unfavourable conditions as regards life and climate, reductions seemed in our case *insult added to injury*. Never-ceasing changes and transfers of officers from division to division and from province to province, the necessity for which it would often be extremely difficult to explain, are a constant cause of inefficiency in the work of our department, and of worry, loss, and anxiety to the officers themselves. No sooner has an officer made himself familiar with the forests of his division or the vegetation of his province than he is transferred elsewhere, and I could in this way point out not a few officers whose long services have hitherto been made up of a series of explorations of successive new regions, not much, it is to be presumed, to the advantage of Government. Under these circumstances it is impossible that the Forest Officer can take a proper interest in the operations or general work committed to his care, knowing as he does that he will not be suffered to witness the results of his labours, or to enjoy the triumph of any special treatment of his in the case of some important forest operation. It is much more reasonable to suppose that he will in the end become thoroughly disgusted with his wandering and objectless life, encouraged as he would be in his downward course in the scale of public usefulness by the generally unsatisfactory condition of his prospects in life. I could go on relating in this way a whole series of other wrongs, but I think I have already gone far enough to show you that we Forest Officers in India are afflicted with more than the seven plagues of Egypt. In conclusion, however, I hope that this letter in your columns will attract the attention of the public, and the authorities at home, who are in a position to help us, and who will insist on justice being done to us with a fair and impartial hand. I should also mention that a friend and fellow-officer of mine has announced his intention of bringing the whole matter forward in the London *Times*, with the laudable view of preventing a number of young gentlemen from entering the department annually, and thus committing a sort of moral suicide through the thoroughly false impression that prevails at home regarding the circumstances of this branch of the public service.

ALSACE-LORAINE.

## SETTING UP A CEDAR.

MOST visitors to Syon will remember the fine Cedar of Lebanon that stands beside the broad walk that leads to the east end of the mansion. During the fierce storm of the 18th ult. the wind drove the tree over so much on to its west side that it was feared it would fall altogether were not some measures adopted to make it secure. But for the fact that the ground was frozen so hard it is possible that the roots might have been torn from their hold altogether; but this tightness of the soil no doubt saved the tree from what otherwise might have been an irretrievable disaster. It is computed that the massive head with its huge expanded branches weighs about 20 tons, and to lift this bulk into an erect position was a work of no small difficulty. Mr. Woodbridge, however, proved equal to the occasion, and borrowing in one direction a hydraulic press, in another screw-jacks, and elsewhere powerful ropes and tackle, he had the tackles secured to the boles of two large trees on the north and east sides, and the ropes fastened high up in the cedar; these being rove into the blocks were ready for action. Meanwhile stout planks and blocks of wood of various sizes were obtained, and these formed foundations for the press and jacks which were fixed beneath the huge branches on the west side of the tree. When all was ready the press, jack, and ropes were put in motion. The tree presently, though slowly, began to heave, and after two hours' hard but persistent labour, the great cedar was once more erect and in its place. Some massive hollow cast-iron columns with crutch heads to fit the limbs are being cast, and these will be fixed upon a concrete base to give the tree the needed support, and it is hoped to maintain it as an ornament at Syon for many years to come.—*Gardener's Chronicle.*

## QUESTIONS.

78. **Working Hours, &c.**—If not occupying too much of your space on so small a matter, I would be glad of the opinion of any of your readers as to the best system of working hours, length of day, time for meals, and ways of payment, &c., for arboricultural labourers and horsemen. These vary in different places; some are paid by the day of so many hours, others by the hour at the work; some have part of Saturdays for a holiday, others have not, and so on. L. R. A.

79. **Decay of Underwood Stools.**—I should be glad if Mr. Robert Baxter, or some other of your readers, could inform me what he considers the probable cause, in instances which have lately come under my observation, of the sudden decay of the stools or stocks of underwood after the crop has been taken. None of the stools have since thrown out any new shoots as they should have done.—E.S.

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## THE FORESTS OF CEYLON.

A contributor to the *Ceylon Times* writes as follows:—

During my recent casual reading I came upon the following suggestive passage, which occurs in the Report of the Government Agent, Southern Province, for last year:—

"A careful examination of the few remaining forests in the province shows that almost all the timber of the valuable kinds is exhausted or only remains in quantities too small and too scattered to make it worth while to cut timber for the market. There is consequently a great want of good timber for bridges and buidings, and serious injury has been done by the general use for several years past of the inferior kinds of timber. The best remedy would probably be to draw for the present on the magnificent reserves of satinwood and palu in the North Central Province, and form depôts for sale at convenient centres in this province; and to provide for the future by forming plantations of teak and other useful timber."

"*Teak plantations.*—If timber plantations are to be of any future benefit, they must be formed with care and method, and not in the haphazard way hitherto adopted. The plantations in the Galle district are worthless: happily they are small and have not cost much. In Matara they are very much better, but until the last few months the trees have been put in too far apart, and there is but little chance of their yielding fine large timber."

## ENGLAND.

FINISH up planting of all kinds in the woodlands, and wherever practicable clear the rides and stop up hedges before the adjoining pastures receive cattle and sheep. As the month advances the risk from continuous dry weather after planting increases. Quick removal and good puddling of roots wherever necessary can alone insure safety.

Such evergreens as holly, yew, laurel, box, and hemlock spruce may now be planted out. Also clear the woods of timber, poles, fagots, and the entire produce of the falls, preparatory to the marking, felling, and stripping of oak. Those to come down should be selected rather for the benefit of the remaining ones, and of the underwood, than for their own market value.

Bark-stripping may be expected to commence during the month. Therefore every preparation should be made early. No operation throughout the whole year requires more energy on the part of both the employer and the employed. A little time lost in starting the work can seldom be recovered. The season does not often last more than a month in the same locality. Insist upon the use of the saw and low cutting for the benefit of both the timber and the stools. See that the bark is carefully and neatly cut round near the ground, and never fall a tree in which the sap does not flow freely. The body bark should be taken off in not less than three or four feet lengths and laid aside for covering up the stack. Peel branches down to one inch in diameter, and stack carefully in open, sunny, or airy situations. About fourteen days in stack, with tolerably fine weather, should put the bark in condition for delivery. Never allow hammering for the purpose of loosening the bark, as such a process lessens its value very materially. Calculate the number of hands required according to the size of the timber and the extent of the fall. Large timber requires less strength to turn out a ton of bark in a given time than that of small size. Taking the season through, we have found that six men and three strong lads will fell the timber and strip and stack a ton of bark in the day.

Wherever new wood rides are to be formed and laid down to grass now is the time to prepare the land and lay down at once. After working the soil down as fine as possible, thoroughly consolidate it and sow seeds as under :—

| | |
|---|---|
| Timothy grass, tall fescue, hard fescue, and meadow foxtail, 2 lbs. of each | 8 lbs. |
| Rough cocksfoot, and smooth-stalked meadow, 4 lbs. each | 8 lbs. |
| Sweet-scented vernal, and rough-stalked meadow, do. | 8 lbs. |
| Wood-meadow grass | 8 lbs. |
| Total | 32 lbs. |

Take care not to bury the seeds too deeply in the soil. During severe frosts cover up all beds of young seedlings. The spray of firs and of the smaller deciduous trees is very useful for this purpose.

The grafting upon forest trees should be proceeded with, the most healthy stocks being selected for that purpose. Badly-cut stools of underwood should be trimmed off neatly with the adze before the buds break out, and where strong and good poles are to be grown, instead of an abundance of small underwood, the stool shoots should be thinned out to what may reasonably be expected to come to maturity in a few years.

In the nursery the work should proceed in earnest, beds being prepared and coniferous seeds sown, these being covered up with fine earth riddled over them. Also deciduous seedlings of all kinds should now be transplanted, and evergreens—such as privet, yew, holly, and firs—as the month advances. Two years' transplanted Scotch pine will be fit to go out permanently. Hoeing in the nursery lines and filling up cleared plots either with other seedlings or with green crops will now be proceeded with. The showery weather of April generally puts the land in good condition for transplanting seedlings and sowing tree seeds.

Sow whin or furze seeds for hedges or for cover. For the latter purpose from 20 to 24 lbs. per statute acre will be sufficient. No hedges of any kind should be plashed after the commencement of this month. Laurels and evergreen shrubs of various kinds may now be pruned, and layers may still be made in situations where the cover is getting thin. If the season is a late one, larch may be successfully transplanted until the month is far advanced.

*Pluckley, Kent.* A. J. Burrows.

## SCOTLAND.

Planting should be finished early this month if possible. In the nursery, however, transplanting may be carried on until the end of April.

Prepare the ground intended for coniferous seed beds—which should be sown about the first week of next month, or the end of the present, if the weather is fine. In procuring seed, such as larch and Scotch fir, care should be taken to ascertain that it has not been saved in a climate much warmer than our own—on this very account a large proportion of seed in the market is altogether unfit for use in this country. Weeping and other varieties of trees should be grafted this month.

The great floods of last month will have done much damage to river embankments in many parts of Scotland. As a precaution against further damage, something should be done on the first opportunity. Take fir trees with the branches on and lay them along the edge of the river, taking care always to overlap the trees, so that the uppermost always covers the end of the one below it—they may be all tied together with steel wire, and a few tons of large stones laid on at short intervals will keep the whole in position. For a permanent job, stones are by far the best material, although more expensive at first.

W. W. R.

## IRELAND.

ALL planting operations should by this time be completed, as it is not commendable that any planting, whether in the woods or nursery, should be done so late in the season. If there are any arrears of such work it is better to delay until autumn. But if there is a necessity for planting in the nursery, it can still be safely done if the roots are puddled. Whenever plants are moved this month, great care ought to be taken to prevent the roots being exposed to the cutting dry wind usual at this season. Look over all late plantings, and see that none of the plants are wind-tossed, and if any are found, have them supported, with stakes for tall transplanted trees, and soil well trodden round smaller plants.

Coppice should be trimmed and regulated, the prunings tied into fagots and removed from the plantation.

Should the weather continue favourable, barking oak can be commenced before the end of the month. It is very desirable to have all necessary arrangements completed, so as to be ready to begin barking as soon as the bark will come off easily. The best bark is that which is taken earliest, and nothing ought to interfere with early barking and proper harvesting of the bark.

Sow all kinds of coniferous seeds in the nursery; watch previously sown beds, and have them protected, should there be any danger of frost. A number of spruce branches stuck into the bed make good protection, and do not require to be moved until all risk of frost is over.

*Ballinacourte, Tipperary.* D. SYM SCOTT

## WALES.

The planting of forest trees will now have been completed for the season; but if the desired extent has not been completed, it will be better to leave the remainder till autumn, than risk planting at this late period. Evergreen trees and shrubs may still be successfully removed and transplanted, with good balls of earth adhering to their roots. Particular care should be taken to have the roots and balls exposed as short a time as possible; and it will be necessary to pay attention to watering, &c.

Hardwood plantations will also have been thinned as far as intended this spring, although fir plantations may still be operated upon. Young larch, spruce, and Scotch fir plantations may be thinned until the peeling commences. The snowstorms and severity of the winter having kept back much outdoor work, now renders greater pressure necessary. With favourable weather, the sap will begin to run, and peeling may be commenced towards the end of the month, when all available strength should be brought to bear on the work.

Erect new and repair existing fences, so as to have all secure before stock is turned out, and have as much odd work finished up as possible, before bark-stripping commences.

The mowing and rolling of grass lawns and walks will now have to be attended to, and if the nursery has not already been stocked for the season, no time should be lost in filling up all vacant ground intended for trees. The ground from which plants have been removed during the past season should be well manured and prepared for a green crop.

*Kinmel Park.* LEWIS BAYNE.

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**TRANSPLANTING LARGE TREES.**—In moving large trees we have found it of almost vital importance to stay the body by ropes or poles, bracing it so that it cannot be swayed by the winds in the summer after the foliage is well out, for that would have a great power for such a tree to resist, and if left to itself, or allowed to be swayed much, the young rootlets that have begun to knit into the new soil will be broken or disconnected, and such movement will prove fatal to any tree, even if it had made ever so promising a start up to that time, and the planter, nearly assured of success, would see his tree droop almost in a day. But if a tree of such size is properly braced it will be most likely to live. As for cutting off the tops of trees when setting them out, which is recommended by many, we don't believe it to be according to nature or to science, but it is barely allowable if a man will not in some way secure such trees against the action of winds for the first year or two, for, with their tops thus denuded, the leverage which the wind will have on the roots by the body of the tree is, of course, much reduced. We may add that the great tree, recently transplanted at Buckland near Dover, is doing well.—*The Farmer.*

# THE HOME FARM.

## OPERATIONS FOR APRIL.

*Arable Land.*—Finish up as quickly as possible all arrears of spring sowing; oats, barley, beans, peas, tares, &c. The bearded or April wheat may be still planted with success upon many soils; but barley is now a more certain crop. *Parsnips* and *carrots* may also be drilled; the former will succeed in gravelly or calcareous soils, or on rather stiff clays, though they are better suited to land which is at once rich and free-working, and attain perfection in the Channel Islands, on a deep sandy soil. The latter grow freely on sandy and loamy soils, or even on deeply-cultivated peat, where the roots can descend easily. Carrots are valuable for horses, dairy cattle, and pigs, and even sheep devour them greedily. Upon heavy lands, where such roots are grown, the *mangold* crop may be got in after the middle of the month, but upon lighter lands, where the progress of the young plants is more rapid, the end of the month is most suitable, owing to the tendency to run to seed. Stir deeply, either by steam or horse-power, the land intended for mangolds, and bury from three to four or five cwt. of salt per acre, sufficiently deep for it not to interfere with the germination of the seed. The chloride of sodium contained in the ash of mangolds indicates the necessity for using salt. Six or seven pounds of seed per acre of Sutton's Mammoth Long Red (a heavy cropper) or the Golden Tankard yellow-fleshed variety (for dairy purposes) will suffice. The Silesian is a long, nearly white wurzel, very rich in saccharine matter. The drills may be any width apart, according to the variety sown, from 18 in. up to 28 in. The Yellow or Orange Globe is also a good cropper, and keeps well. The *potato* crop should be in not later than the beginning of this month. The variety is so great that each must choose for himself according to soil and other circumstances. Fifteen years' continuous growing of Pattison's Victoria has proved to the entire satisfaction of the writer that it is an abundant cropper upon a variety of soils.

*Steam cultivation*, wherever available, as a preparation for all root-crops, should be pushed on in suitable weather. Deep stirring and a thorough pulverization are preferable to ploughing at this season, as the necessary moisture is thereby retained in the soil.

*Lucerne* may be drilled or sown upon a light calcareous loam, the subsoil of which is not wet. The land should be in good heart, and perfectly clean. The middle of April is a good time to get it in. The seed should be only lightly covered. Fifteen pounds per acre of really good seed is sufficient, but it is generally safer to use more. It is a crop which requires clean cultivation, and it soon dies out if allowed to get foul.

*Flax* is a crop of limited cultivation. A strong loamy soil suits it best, as it does not flourish either upon light sandy land or adhesive clay. Too rich a soil causes the crop to become laid before it is ready for pulling. It is often taken after grass or clover, or even after a corn crop. It does not stand frequent repetitions upon the same land. The land requires to be well prepared as for carrots.

The hoeing of wheat and some other early sown crops, both by horse and hand, will now be going forward, and the heavy roller—Cambridge or Crosskill, according to the land—will be required upon autumn-sown crops. Those implements will be better employed thus than in the attempt to reduce fallows, which must to a certain extent be left to weathering influences.

*Clover and Grass Seeds*, whether for permanent pasture or for rotation, should be sown early in the month, either with or without a corn crop. With care in the selection of seeds and in the sowing, a fine surface and a firm bottom, good crops may be looked for. Either the Suffolk drill, the seed barrow, or hand-sowing may be resorted to, according to circumstances. Light and heavy seeds are generally best sown at two operations. One sowing may advantageously cross the other. From thirty-five to forty-two pounds of seed will be sufficient for an acre. If the land is heavy, finish up with a turn of the bushed harrows, but if light roll it well down.

*Live Stock.*—The work of the horses will still be heavy, and the feeding should be proportioned. Mares now getting heavy in foal should be turned off, and either have the run of good open yards or the paddocks. As the carrots are finished up a few pulped swedes or even mangolds may be substituted, or if the roots can be steamed so much the better. Fat cattle will now be going to market, and those still on hand should be pushed forward as rapidly as possible. The mangolds may now be used in moderation for stock of all kinds. The treatment of breeding ewes will be similar to that recommended for last month. Liberal supplies of dry food, roots, some linseed cake and beans, will be found to help them materially. Fatting pigs of large size should at once be killed for home use or marketed.

*Hops.*—The cutting or dressing of the hills being finished, burn up the old bine at once. Stub sets should be planted out as fast as they are cut. Any covering up in heaps, even for a short time, can hardly fail to generate mould. Poling may at once be commenced, but it should be carried on only when the land is fairly dry. Treading in wet weather will probably make the gardens work unkindly throughout the summer. The poles should so be set up that the shims and midgets will work tolerably close to the hills, at least in one direction. The tops should also be so spread as to be equidistant from each other throughout the length and breadth of the garden. Thus the maximum of sunshine and air is admitted, and mould may be the more easily checked. The poles should be firmly set up beyond all risk of blowing down when heavily loaded with bine and hops. Incalculable damage to the crop may be the consequence of bad poling.

*Meadows and Pastures.*—Continue to drag and roll meadows, especially those intended for mowing. A bite of young grass for sheep, and of a stronger herbage for cattle and colts, especially in the spring, should be the rule upon all grazing farms.

*Dairy.*—As calves are weaned and an early cut of Italian rye-grass or a bite in the more forward meadows is available, the produce of the dairy may be expected to increase. Boiled linseed may be largely substituted for milk in feeding the calves. Sweet hay and finely-cut swedes will keep them in good condition. Comfrey may be cut and carried to the cows, and upon early soils rye will now be available.

*Poultry* will require much the same treatment as was detailed last month. Attend well to all young chickens, feeding them with bread dipped in milk. Weakly ones may require food more stimulating, in which case port wine or ale may be substituted for the milk, but in this case the bread should be squeezed nearly dry before it is given. Let young goslings have the run of a common or some short meadow-grass. They will still require soft food. In warm weather let the young ducks frequent the ponds. The turkeys may now be expected to sit. Many people put their eggs under the common hen, and by this means the young brood is not dragged over so wide a range as when reared by the turkey hen. But as the birds get older they often do best with their natural mother.

*Estate Work.*—April is generally too busy a month upon the farm to admit of the horses being much employed in other matters. But the falls should at once be cleared of timber and underwood produce, and as soon as the oaks are felled and stripped, these also should be removed.

[We have, during the year, endeavoured to give as full a calendar of Farm operations as is necessary for the guidance of those entrusted with the management of home farms or with farming work of any kind. Particular districts have their special crops, though there are few of wide cultivation which have not been treated of. The grand secret of success upon all soils and all situations is the liberal feeding of young stock, healthy, clean, and well-ventilated lairs, covered yards for manures, liquid-manure tanks to prevent waste, and keeping the work well in hand at all seasons of the year, as the weather permits. The more extensive cultivation of roots and forage crops, and the production of more beef, mutton, pork, butter, poultry, eggs, and fruits, must in the future be the farmer's main reliance, and all these are especially necessary as products of the HOME FARM.]

*Pluckley, Kent.* A. J. BURROWS.

## THE EDINBURGH ARBORETUM.

THE following is the text of the Memorial of the Council of the Scottish Arboricultural Society to the First Commissioner of Her Majesty's Board of Works, Whitehall:—Your memorialists having been appointed by the Scottish Arboricultural Society to embrace any favourable opportunity of memorializing Her Majesty's Government on the subject of forest education in Scotland, we venture at this time to address you in regard to the ground adjoining the Royal Botanic Gardens, Edinburgh, recently acquired for the purposes of an arboretum, and for which it is so admirably adapted, owing to its character, and proximity to the Botanic Garden, of which it may be said to form a part.

The absence of any school of forestry in this country has been long regretted, and is in our opinion a national blot; but the present seems to be a singularly favourable opportunity for taking a step towards supplying this desideratum.

The society which we represent consists of about 800 members, from all ranks of the community, embracing a large number of practical foresters, and we hail with much satisfaction the prospect of the formation of an arboretum where the cultivation of rare and valuable trees brought together in one centre may be carried on and utilized for systematic instruction in forestry.

This object has been under our anxious consideration for several years, and cannot be better explained than by quoting the following extracts from the inaugural address in 1879 of the ex-president of the Society, the Right Honourable W. P. Adam, now Governor of Madras.

Referring to the want of a school of forestry, he says (*Trans. Scot. Arbor. Soc.*, Vol. IX., Part 2, page 109):—"This portion of our educational system, tending so much to the benefit of the State, is undertaken by every nation of any consequence except our own. I trust this neglect of an important branch of our national well-being will not be continued, and considering the importance of the forests of our Indian Empire and colonies, we shall not always have to send young foresters to be taught their business abroad. It may be said that we have no large forests in this country under the care of Government, in which this course of instruction can be given satisfactorily and systematically, but I do not think this argument holds good. There are many extensive woodlands which may be visited and examined, but the practical part of the training does not necessarily require a great extent of forest. I believe, looking to the addition lately made to the area possessed by Government in these gardens, that a school of forestry might be established in this very place, where all the operations of forestry might be practised and taught."

Again, "I maintain that for all practical purposes of home work perfect training might be given here. I am glad Government have acquired the additional ground adjoining these gardens, and I hope that financial exigencies will not prevent their proceeding to turn it at once to useful account, and that this may be the prelude to the establishment of a national school of forestry in an arboretum worthy of the name of 'national,' which would be at once an ornament to these gardens and a credit to the country. At the same time I trust that the valuable collection of woods and cones which this Society possesses will not be allowed to remain inaccessible, but will be placed so as to be seen and examined, and serve as a means of education and improvement."

The Botanic Garden is reserved for instruction in general and medical botany, and we venture to urge that, in like manner, the newly-acquired ground should be devoted to the purposes of instruction in forestry, and that the same rules be made applicable to it which at present govern the Botanic Garden.

Your memorialists are prepared, in the event of the ground being devoted to an arboretum for educational purposes, to deposit for public exhibition and instruction the library and collection of forest specimens and produce alluded to by the Right Honourable W. P. Adam, as being inaccessible for want of space in the Royal Botanic Garden.

In the name and by authority of the Council of the Society,
ROBERT HUTCHISON, Vice-President, S.A. Society.

*Edinburgh, March* 12, 1881.

TIMBER-GROWING FOR PROFIT.—The wholesale destruction of the forests of the world is rapidly becoming a very important topic in economic science. England is a fairly well-wooded country; but there is abundant reason to believe that a good deal more timber would be beneficial to us in a variety of ways. It hardly seems to have struck owners of considerable estates in modern days that timber-growing may be made very profitable; but that such is the fact there can be no reason to doubt. The return upon the capital invested is, obviously, not immediate; but the comparatively small outlay which planting requires, and the very respectable interest which is yielded, will abundantly recompense the landowner for waiting. The majority of country gentlemen have an annual "thinning," which produces perhaps just enough to maintain the most modest of stables; but, were planting carried on systematically, of set purpose, a very handsome return would, in a decade or two, be yielded to those who can afford to wait. If the proposed School of Forestry should become an accomplished fact, public attention may in that way be prominently directed to this very important matter.—*Perthshire Constitutional.*

*Elementi di Tassazione ed Assestamento Forestale.* Second notice.

Continued from page 745.

A GRAPHIC account of a visit paid to the Forest Institute in 1875, when it was under the directorship of the Cavalier di Beranger, by Dr. Hugh Cleghorn, formerly Conservator of Forests in the Madras Presidency, was submitted to the Scottish Arboricultural Society, and published in the Transactions of the Society. And in illustration at once of the state of the better managed forests in Italy, and of the mode of conducting educational excursions made by the students of the Forest Institute, there has been prepared for this *Journal* a translation of a report given by the Cavalier Piccioli, of an excursion of the students, conducted by him, to the forests of Camaldoli, and of the Casentiono, which is forthcoming whenever space for it may be found. There has also been prepared a translation of a report of the provision made for the instruction of the students in Forest Science and Forest Economy within the Institution—in regard to which it has been reported in this *Journal* that workmen in the forests, as well as officials directing their operations, are now required to avail themselves for a time of the educational advantages there to be enjoyed.

In Sylviculture in the *Campagna Romana*, in Reboisement on the Mountains, and in the conservation and improved management of the existing forests, there is sought to be secured in combination, and each in perfection, without detriment to the other, sustained production of wood and timber, a progressive improvement of the woods and forests, and a natural reproduction of these from self-sown seeds until the cycle of exploitation is completed. In order to do this, it is necessary that correct inventories of the trees growing in every subdivision of the forest should be at the command of the administrator of the management of the whole, and statements of the treatment to which each subdivision should be subjected. And it is to this that the volume before us refers.

The term *tassazione* and the corresponding French term, *taxation*, bear in works on forest science, published on the Continent, a technical application altogether different in its outcome, if not in its origin, from that of taxation in English. It comprises an estimate of the cubic contents of a wood or forest, or forest patch; of the probable annual increase of this in subsequent years, based on past growth and present and prospective vigour of growth, affected as this may be by soil, climate, and inclination, and exposure of the ground, and of the pecuniary value of the produce in the present and in the future. And something similar may be said of the term *assestamento*, though this may come nearer in import to the English term *assessment*, seeing it relates to what quantity of produce may be taken from different sections of the forest.'

In the first part of this volume treating of taxation, details are given in regard to instruments employed in the measurement of trees devised by different students of forest science, for the determination of the circumference of the trunk and boughs, of their altitude, their annual growth, and their cubical contents, and in regard to the application of them, with a critical discussion of the results obtained, and a fuller discussion of what may be done further in determining the cubical contents of felled timber and of growing trees, and of the increase of these obtained by growth in single trees; and this is followed by an application of what has been advanced, to forest masses, and the discussion of measures which have been proposed for determining the density of the growth of trees in sections of forests, and the classification of classes founded upon this; for determining the cubic measurement of wood in a standing forest, the annual increase of this, the construction of statistical tables of such increase, in successive years, and the determination of the cubic measurement of products obtained by thinnings.

In the second part, treating of what, in contradistinction to forest taxation, is called forest assessment, which may be considered as an estimate of what amount of produce a forest may be able to yield, there are described the different *governi* or *regimes* under which a forest may be managed, that of coppice wood, or timber forests, or a combination of both; and there are discussed the approximate duration of exploitation and reproduction to be adopted according to different ends, which may be sought under different *regimes;* methods of calculating what produce is yielded by regular exploitation, and what proportion this bears to the annual increment made by growth; what kinds of fellings should be carried out, and how these should be chronologically arranged and distributed over the forest, to secure from the forest a sustained production; different methods of determining what is the average state of an entire wood or forest; the consequent classifications of woods, and calculations of other important averages which may be thus obtained. What is thus discussed refers to fundamental principles, and there follow discussions of the operations comprised in making an assessment. These are divided into what are preliminary, what are special, and what are testing or probative of the correctness of these.

Among the first are reckoned surveys, charts, inventories, and descriptions of the contour and general conditions of the forest in its entirety and in its various parts, and combined summaries of these. The second relates to the determination of what produce the forest will yield, without detriment to its condition, under the *régime* proposed; and the third, to comparisons in subsequent years, of the actual produce or proceeds of sale, with the prospective estimates which had been formed.

Extracts have not been given, because the whole work relates to the most advanced forest management of the day—that known in France as *La Methode des Compartments;* in Germany, as *Die Fiachwerke Method;* in Russia and some other countries by designations which may be translated

*The Rational Method*, and it is that which is taught in all schools of forestry on the continent of Europe. The object sought is, as here stated, to secure sustained production in combination with natural reproduction, and progressive improvement of the forest under exploitation, which are collectively and severally objects which it would be most beneficial to secure in the management of forests in British colonies and newly-settled lands, but which is not yet generally known amongst the foresters of Britain. JOHN C. BROWN.

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*The Fields of Great Britain.* By HUGH CLEMENTS, of the Board of Trade. London: Crosby Lockwood & Co.

THIS book is a valuable contribution to the science of agriculture, and a *vade mecum* for the student and the practical farmer. Hitherto one of the greatest hindrances to the economical and the successful prosecution of the work of the agriculturist has been his want of an intimate acquaintance with the elements of matter, and his consequent inability to test the requirements of the soil he cultivates, and the genuineness of the artificial manures and foods he uses. Owing to this lack of chemical knowledge he has been unable to detect the deficiencies of his fields and the worthlessness of many of the manufactured manures and feeding stuffs placed upon the market. As a guide to such the present little volume is admirably adapted by the conciseness of its language, its copious table of contents, and its complete index.

In thirty-six short but comprehensive chapters the author treats of soils, manures, food and feeding, plant life, vegetable compounds, seeds, crops, rotations, water, grasses, drainage, irrigation, farm buildings and implements, orchards and fruit gardens, woods and plantations, the breeding and management of farm stock of all kinds, and a variety of other useful subjects. As a book of reference for the subjects upon which it treats, we know of nothing better, and we have met with few works of equal value.

As a specimen of the value of the instruction given upon practical subjects we select the following on the analysis of soils:—"A rough analysis of a soil may be made by drying a certain weight, when the loss in weight gives the water present. Burn it on a piece of clean iron, when it blackens if carbonaceous matter is present, and the blackness disappears as the volatile elements—carbon, hydrogen, nitrogen, oxygen, sulphur, and phosphorus—pass off. The loss in weight gives the amount of vegetable or organic matter present in the soil. By passing the residue through a fine sieve, pebbles, &c., are separated from the finely-divided soil. Weigh both. When this soil is put in water it partly falls to the bottom, partly floats, and is partly dissolved. The portion that falls to the bottom is heaviest, and consists of sand, silicate of alumina, with varying proportions of lime, potash, magnesia, soda, &c. The portion that floats on the water for some time consists of the impalpable powder clay, which may be poured off, leaving the sand, &c., behind, which dry and weigh; evaporate the water, when the solid residue left behind constitutes the soluble mineral constituents.

"By ordinary chemical analysis, into which we cannot enter here, the farmer can tell from the proportion of the soil soluble in water, and also in weak acids, what constituents are present in a maximum and what in a minimum state as available plant food. And from this knowledge he will not fall into a common error of manuring at random, and apply expensive constituents to a soil in which these constituents are already present in a maximum, but will only apply those manures which supply the constituents that are either absent or in the insoluble form, or present only in a minimum. The law of minima is one which farmers would do well to study, and thereby save themselves from unnecessary expense. Although the chemical analysis of a soil cannot always be absolutely depended on, yet it is one of the factors that should never be overlooked in the estimation of the relative values of land.

"It is almost as necessary for the farmer to know the real condition of the soil of his farm as it is for the merchant to know the real state of his affairs, as shown by a list of assets and liabilities. When the state is known, an honest and prudent merchant will not overdraw his account, nor will a good farmer overestimate or exhaust the resources of the soil. He will not, for instance, attempt to grow a crop from land in which a sufficiency of the constituents required by the crop does not exist, and so run the risk of losing his reserve fund, if he is fortunate enough to have one on which to fall back."

In a handbook of this size the space devoted to trees is necessarily small. But the following pertinent remarks upon the subject of planting waste lands occur in the *Introduction*:—"There are few sandy wastes or boggy levels that, planted with trees, would not in thirty years yield the owner of the ground a rent of £1 per acre per annum, where now the farmer cannot pay him 5s. per acre. On this subject the vulgar outcry against making corn farms or sheep farms into deer preserves or forests, as being antipatriotic and opposed to the interests of the working classes (robbing a poor man of his right to labour, of his bread, &c.), must be at once silenced and dismissed. Whether the acres produce potatoes or partridges, venison and sport, or mutton and many shepherds, is no longer the affair of those who have adopted the political motto of buying wherever you can in the cheapest market."

But few practical foresters will follow the directions herein given for raising hardwood plantations by putting in the trees at 25 or even 30 ft. apart, and filling up all intervening spaces with nurses of larch, spruce, &c. The planter who commenced with only his sixty-nine trees per acre at 25 feet apart, or his 48 at 30 feet asunder, instead of 300 (12 ft. apart) or 557 (at 9 ft.) would leave no margin as an allowance for failures and accidents of all kinds, and in all probability would never live to see his plantation regularly stocked with the necessary kinds.

One of the most useful features of the volume is its lengthy and well-arranged table of the constituents of various kinds of food. This is one of the most complete we have anywhere met with, and it is followed by several chapters treating of the practical application of the principles of successful and economic feeding. No young farmer or student of agriculture should be without this book, which by its size and admirable arrangement of subjects is well adapted for a pocket companion, and even the more experienced farmer will find in it many valuable hints and directions, which if acted upon will lessen his expenditure, and enable him by amore abundant production of animal food, as well as of root crops and cereals, to better his position financially.

Another quotation from these pages can hardly fail to interest the readers of the *Journal of Forestry* :—"Many plants will only grow or grow best in tropical or torrid regions, others in temperate, and others in polar regions. The *Pamella nivalis*, lichens, and mosses are peculiar to the Arctic regions. Birch, pine, fir, furze, broom, heath, &c., are confined to the temperate regions. Liquorice, asparagus, wormwood, &c., are peculiar to the European steppes; birch, pine, willow, &c., to the Siberian steppes; prickly shrubs and scanty grass to Central Asia; British plants to central Europe; caryophyllaceæ, labiateæ, evergreens, &c., to the shores of the Mediterranean. The vegetation of north, west, east, and south Africa is peculiar, so are the fig, coffee, senna, and dates to Arabia; the banana, banyan, cocoa-nut, palm, mango, orange, plantain, vine, &c., to India; spices to the Indian Archipelago, and ferns to New Zealand and Australia. The sugar-maple, the magnolias, pitch pine, and cinchona are confined to certain districts of America, and tea is chiefly grown in China and the Japan islands. And returning to the British Islands we find that there is a peculiar vegetation in the west and south-west of Ireland corresponding to that of the north and west of Spain. The vegetation of the south-east of Ireland and south of England resembles that of the Channel Islands and the north-west of France. The south-east of England is similar to the north-east of France. The tops of the highest British mountains have a vegetation that is Scandinavian in its origin, while most of the common plants of the cultivated districts in England are Germanic. From the poles to the equator the growth of plants roughly divides the surface into regions corresponding with certain zones of climate. Thus the arctic, sub-arctic, cold temperate, warm temperate, sub-tropical, tropical, and equatorial zones roughly correspond with (1) lichens, mosses, &c.; (2) birch, fir, and pine; (3) oak, wheat, and deciduous trees; (4) wine grape, evergreen trees, &c.; (5) laurels, myrtles, coffee, sugar-cane, &c.; (6) fig, olive, tree-ferns; (7) palms, spices, and bananas."

## OUR FOREIGN EXCHANGES.

Besides the exchange numbers of periodicals published on the Continent, there has been received from Russia a copy of the St. Petersburg *Zeitung*, from an article in which it appears that the progressing destruction of the forests is still commanding public attention. When I was last in St. Petersburg there were shown to me calculations of increase and consumption of wood, which showed that unless sylviculture be extensively carried out, within a definite period, not very protracted, the country would be ruined through want of wood.

From Switzerland has been received a *brochure* entitled "*Ueber den Einfluss der Wäläer auf die Quellen und Stromenhältnisse der Schweiz,*" a brief treatise on the influence of forests on the condition of springs and streams in Switzerland, by Robroh Lauterburg, civil engineer in Berne—the third edition of a reprint of a paper read by him at the annual congress of the Swiss Society of Natural History, held at Basle in 1876, and published in the Transactions of the Society. It relates to a subject well deserving of study in connection with the discussion at present going on in regard to the best means of preventing destructive inundations in Britain.

In the *Revue des Eaux et Forêts* is given the conclusion of a series of papers by M. F. Briot, on the "Pastoral Husbandry of the High Alps," and a reply by M. A. Gurnand to objections taken by M. Madon to views advanced by him in regard to the light reflected from timber forests, and the growth of wood in them.

In the Spanish *Revista de Montes* there is given the commencement of a treatise on the calculation of altitudes by barometric observations by Don Daniel de Cortazar, forest engineer; and a translation of the following statement by the Naples correspondent of the *Daily News* in regard to the culture of the blue gum in Italy:—"This as lovely as healthful tree is destined to play a great part in the improvement of Italian soil. Senator Torelli, in his project for draining and improving the malaria districts through which so many Italian railway lines run, indicates the planting of the eucalyptus as a principal means to this end. Private people and railway companies have made trial of various species of the eucalyptus at many points, and in all cases the result has been most beneficial. In North Italy the *Eucalyptus amygdalina* has succeeded well in exposed places. A most magnificent example of this species may be seen in the garden of Prince Troubtzkoi, near Intra. The tree is only ten years old, and already measures about five feet in diameter and sixty feet in height. In 1874 the railway company Alta Italia planted 462 trees at Ventimiglia, since which time the sanitary condition of that place has greatly improved. A Florentine lady made a large plantation of various species of eucalyptus near Viarregio, and it was found that the *urnigera, viminalia, meliodora* and *resinifera,* as well as the adult *globulus,* bore the climate well. At Grosseto and Orbetollo General Ricasoli planted sixty-eight species of eucalyptus, most of which succeeded well; and at Santa Severa, one of the most unhealthy of places, the *globulus* had already had a beneficial effect. In the hanging gardens of Prince Aldobrandini, at Rome, there is a *globulus,* sixteen years old and sixty feet high, with robust branches thirty to thirty-five long—a development which sufficiently proves that the tree can not only exist, but prosper, in Rome. In the same garden there are about twenty other trees, which bore the extraordinary cold of last winter without damage. The largest field of experiment, however, is the Tre Fontane, three kilometres outside Porta Ostiense, where the Trappist monks, aided by the State, have fought a fight against the malaria. In 1688 the air of this place, especially at the monastery, was so deadly that it was found sufficient to pass a night there to catch the fever. The monastery was known by the by-name of the Tomb.

In 1869-70 the Trappists made drains, and plantations of the eucalyptus, going during four years to pass their nights at Rome, in which space of time they lost twelve of their number by miasmatic fevers. At the end of four years they could again sleep at the Tomb, and continued their efforts at improvement; and last year a large concession of territory was made to them, with the obligation to plant 100,000 eucalyptus trees in ten years. Senator Torelli defines the eucalyptus as a natural pump, and he is right. From experiments made by the French Government on the hygienic results of plantations of this tree, it is proved that it absorbs ten times its own weight of water, which is returned to the atmosphere in the shape of vapours rich in camphor. A Captain Mignard, who was annoyed by the mosquitoes in Algeria, tried the effect of planting a small eucalyptus in a pot, and placing it in his bedroom, and found it entirely drove away the tormenting insects. The *Temps* publishes the fact that a proprietor in Provence, who had planted many eucalyptus trees on his estate, found that insects disappeared, and his vines were exempt from parasites. Some of his neighbours, following his example, succeeded in driving away the phylloxera from their vineyards. These facts, taken as a whole, completely justify Senator Torelli in demanding that the plantation of the eucalyptus in all the infected regions of Italy should be made obligatory by law."

A translation of a detailed *résumé* of the report by Sr. Torelli, which appeared in the Italian *Nuova Revista Forestale*, has been prepared, and is forthcoming if required. JOHN C. BROWN.

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COMPOSITION OF WOOD ASHES.—American chemists give the following as the average approximate composition of wood ashes:—

| | |
|---|---|
| Potash ... ... ... ... ... ... ... | 8·5 |
| Soda ... ... ... ... ... ... ... | 2·5 |
| Lime ... ... ... ... ... ... ... | 39·0 |
| Magnesia ... ... ... ... ... ... | 4·5 |
| Phosphoric acid ... ... ... ... ... ... | 2·5 |
| Sulphuric acid ... ... ... ... ... ... | 1·0 |
| Carbonic acid ... ... ... ... ... ... | 25·5 |
| Oxide of iron, silica, sand, and charcoal ... ... ... | 14·5 |
| Water ... ... ... ... ... ... ... | 2·0 |
| | 100·0 |

Professor Storer examined thirteen samples of house ashes, and found a variation of potash of from 6 to 10·8 per cent. Samples of chestnut, oak, and hickory ashes made in a stove were found to give the following analysis, it being explained that some sand or soil had been adhering to the wood burned, and that that reduced the portion of potash, lime, &c.:—

| | Chestnut. | Oak. | Hickory. |
|---|---|---|---|
| Potash ... ... ... | 3·07 | 9·37 | 4·56 |
| Soda ... ... ... | ·42 | 1·92 | ·53 |
| Lime ... ... ... | 29·15 | 29·65 | 36·29 |
| Magnesia ... ... ... | 9·63 | 3·65 | 5.71 |
| Iron oxide ... ... ... | 5·21 | 3.73 | 2·79 |
| Phosphoric acid ... ... | 2·51 | 2·42 | 1.63 |
| Sulphuric acid ... ... | 2·46 | 1·88 | ·99 |
| Chlorine ... ... ... | ·17 | 1.49 | ·19 |
| Carbonic acid ... ... | 12·80 | 16·57 | 32·22 |
| Sand and silica ... ... | 26·70 | 22·07 | 18·09 |
| Charcoal ... ... ... | 3·26 | 1·97 | 1·51 |
| Water and loss ... ... | 4·62 | 5·28 | 4·49 |

**The New Forest.**—Mr. H. E. Holloway has succeeded his father (Mr. T. J. Holloway) as keeper of Holmesley Walk, and Assistant Surveyor of the west district of the New Forest. Mr. T. J. Holloway retires on a pension, after about forty-two years service, and he takes with him in his well-earned retirement the best wishes of all for his future health and happiness.

**An Exhibition of Agricultural Machinery and Forestry Appliances** will be held at Hanover, Germany, from July 16 until July 24 next. The building selected for this purpose is the Central Cattle-yard, close to the town. A special line of rails will connect the exhibition with the railway station. Besides numerous medals, diplomas, and honourable mention, a sum of 55,000m. has been reserved for awards.

**Ancient Cedars.**—One of the fine old Cedars of Lebanon which, for more than two centuries, have adorned the gardens here, fell during a gale from the north-east on the night of the 6th inst. The length of the tree as it lies, is 72ft., the breadth 69 ft., the trunk 1 ft. from the ground is 18 ft. 6 in. in circumference, and at 13 ft. from the ground is 15 ft. 4 in. The most singular part is that it has stood so long, the whole of its main roots being as rotten as touchwood and covered with white mould, and, as if struggling for existence, it has pushed out several young fibrous roots close to the butt.—*T. White, Arbury Hall, Nuneaton, in "Garden."*

**Fourfold-stemmed Oak.**—Amongst the noble trees at Pains Hill, Cobham, Surrey, is a very large oak which some hundreds of years ago was made a pollard. Wedlake Brayley thus speaks of it in his history of Surrey: "There are some remarkable oaks in different parts of the grounds at Pains Hill, some having double trunks, and one of a majestic growth is distinguished by a fourfold stem." It is this latter of which I am going to give you a faint description. At 3 ft. from the ground its circumference is 28 ft. 10 in.; at 6 ft. from the ground it divides itself into four branches, the circumference of No. 1 is 15 ft.; No. 2, 12 ft. 6 in.; No. 3, 11 ft.; and No. 4, 8 ft. 6 in. It is not very high, but has a spread of branches of 84 ft. When Mr. Vernon Heath was down here, a few years ago, he very much wished to photograph it, but whether he did or not I am unable to say.—*Garden.*

**The Conifers at Dropmore.**—I have recently taken the dimensions of the three following trees, and being often asked for them by those who visit the grounds, I send them to you to be put on record:—*Araucaria imbricata*, height, 61 ft.; diameter of branches, 33 ft., resting on the ground; girth of trunk, 3 ft. up, 7 ft. 3 in. *Cedrus deodara*, height 64 ft.; diameter of branches, 43 ft.; girth of trunk, 8 ft. 2 in. *Cryptomeria lobbii*, height 46 ft.; diameter of branches, 15 ft. 6 in.; girth, 3 ft. 4 in. A Deodar's trunk at 2 ft. 6 in. from the ground, girth, 10 ft. 6 in., which is the largest here, but there are some still taller than the one given. There are no conifers doing better than the *Cedrus deodara* are here, growing more freely than the Cedar of Lebanon, and much more graceful in habit. Plant them high and dry, but not in low damp situations.—*Philip Frost, Dropmore, March 4, in "Gardeners' Chronicle."*

Trees in London.—At last the litter is fairly cleared away in Kensington Gardens, and one begins to get reconciled to the change. The place where the trees have been felled looks rather like the head of a person who let his hair grow too long and then gave the hair-dresser *carte-blanche* to crop him. There is no doubt that the trees skirting the Broad Walk did stand far too thickly, and at first it seemed that we had run violently into the opposite extreme and done something more than was necessary. But now that the felled timber has been removed one can see that the landscape will be a pleasing one.—*Farmers' Gazette.*

Distinguishing Deciduous Trees by their Young Leafless Branches.—Practical nurserymen are able to distinguish species, and even varieties of deciduous trees and shrubs, by differences in the bark often only appreciable after long observation. In many instances, however, the differences are great and easily described, and it would be very useful to include such characteristics in works on dendrology. In the *American Naturalist* for January, Professor Beal illustrates and describes what we may term the winter distinguishing characteristics of various species of populus and juglans.—*Gardeners' Chronicle.*

Big Trees.—Referring to big trees, the *American Register* tells us that a grove of trees in California, consisting of 1,680, contains not one which measures less than six feet in diameter. A rare and magnificent white oak is to be seen in the Quaker burying-ground in Salem, N.Y. It is more than 200 years old, and is remarkable for its enormous branches, which have a spread of 112 feet. A remarkable chestnut-tree is growing on a farm in Berks, Pa. It is nearly forty feet in circumference at the base, and the top of the tree can be reached by steps fastened between the limbs. Most remarkable of trees with a history is a russet apple-tree in Skowhegan, Me., which was planted in 1762. In its branches a play-room for children has been built for half a century. The tree is seven feet from the ground to the branches, five in number, all of which are very large and average thirty feet in length, covering a space of ground sixty-three feet in diameter. It is more than four and a half feet in diameter, and has yielded an average of thirty bushels of apples each year. A sprout from this apple-tree stands thirty-two feet from the parent stem, but is forty-eight years younger.

The Usage of the Box Tree in Agriculture.—The box is an evergreen plant belonging to the euphorbiacian genus, of which the very hard and yellowish wood is much used in toy-making. It is not of the wood we would speak, but of the leaves or twigs, and their employment in agriculture. M. Pierre, in his lectures on agricultural chemistry, expresses himself in the following terms:—"When we consider it in a dry state it contains double the amount of azote to that found in a dry dunghill." Thus it is clear that the box-tree contains a large amount of azote and makes an excellent manure, as it is generally known that the utility of manure is in proportion to its richness in azote. It is therefore a very great advantage to utilize the branches of the box-tree whenever they can be procured without paying too dear for them. Many people in Herault, Le Gard, and L'Ain, use the branches of box as litter, and the trampling of the animals' feet produce a species of trituration which assist fermentation when it is put on the dunghill or in heaps on the soil. But if the dunghill benefits by the usage of box as litter, the horses must find it a hard bed. Thus we advise agriculturists who use it to cover it every evening with straw; in this manner the animals are more comfortable and the straw absorbs the superfluous moisture, as the box is so close in texture that it scarcely takes up any damp.

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